MEP Constructions for Buildings and Spaces

Contents

Exposed beams, 3 in cement-fiber slab, no insulation
    - Exposed beams, 1 1/2 in wood plus R-6 insulation
    - Exposed beams, 1 1/2 in wood plus R-7 insulation
    - Exposed beams, 1 1/2 in wood plus R-10 insulation
    - Exposed beams, 1 1/2 in wood plus R-12 insulation
    - Exposed beams, 1 1/2 in wood plus R-15 insulation
    - Exposed beams, 1 1/2 in wood plus R-17 to R-18 insulation
    - Exposed beams, 1 1/2 in wood plus R-20 insulation
    - Exposed beams, 1 1/2 in wood plus R-21 to R-23 insulation
    - Exposed beams, 1 1/2 in wood plus R-24 to R-26 insulation
    - Exposed beams, 1 1/2 in wood plus R-27 to R-29 insulation
    - Exposed beams, 1 1/2 in wood plus R-30 to R-32 insulation
    - Exposed beams, 1 1/2 in wood plus R-33 to R-35 insulation
    - Wood block, concrete, plasterboard
- ExteriorWall:
    - Standard wall construction - A
    - Standard wall construction - B
    - Standard wall construction - C
    - Brick / block wall
    - Timber-frame wall
    - Lightweight curtain wall
    - Metal-clad wall
    - Brick / block wall
    - Brick / block wall
    - Timber-frame wall
    - Brick / block wall
    - Lightweight concrete-clad wall
    - Brickwork single-leaf construction dense plaster
    - Brickwork single-leaf construction light plaster
    - Un-insulated brick/block wall
    - Super-insulated external wall
    - Sheet steel
    - Sheet aluminum
    - Brickwork single-leaf construction with insulation and plaster
    - Brickwork single-leaf construction fiber insulation and render
    - Brickwork single-leaf construction EPS insulation and render
    - Lightweight concrete block air gap and plasterboard
    - Lightweight concrete block GRP insulation and plasterboard
    - Lightweight concrete block poly-insulation and plasterboard
    - Brick cavity with dense plaster
    - Brick cavity with mineral insulation and lightweight plaster
    - Brick cavity full mineral insulation and lightweight plaster
    - Brick cavity with UF foam insulation and lightweight plaster
    - Brick, heavy concrete block, phenolic foam, light plaster
    - Brick, heavy concrete block, mineral insulation, light plaster
    - Brick, medium concrete block, foam insulation, light plaster
    - Brick, light concrete block, foam insulation, light plaster
    - Brick, light concrete block, light plaster
    - Brick, foam insulation, light concrete block, light plaster
    - Brick, mineral insulation, light concrete block, light plaster
    - Face brick, insulation, light concrete block
    - 4 in lightweight concrete
    - 4 in face brick, 8 in common brick
    - 4 in face brick, 8 in heavyweight concrete block
    - 4 in face brick, 8 in lightweight concrete block
    - 4 in face brick air space and 8 in clay tile
    - 4 in face brick air space and 2 in heavyweight concrete

- 4 in face brick air space and 4 in common brick
- 4 in face brick air space and 4 in heavyweight concrete block
- 4 in face brick air space and 4 in lightweight concrete block
- 12 in heavyweight concrete
- 8 in heavyweight concrete with 2 in insulation
- 8 in heavyweight concrete with 1 in insulation
- 8 in heavyweight concrete with air space
- 8 in heavyweight concrete
- 4 in face brick 8 in common brick with 1 in insulation
- 4 in face brick 8 in common brick with air space
- 4 in face brick air space and 4 in lightweight block
- Wall with 3 in fiberglass insulation and stucco outside finish
- Two-sided brick wall with air space
- Brick wall 8 in concrete block and no air space
- Brick wall with 4 in concrete block
- Brick wall with 8 in concrete block
- Brick wall with 6 in concrete
- Frame wall with 2 in insulation and 4 in brick veneer
- Frame wall with 2 in insulation
- Metal curtain wall with 3 in insulation
- Metal curtain wall with 2 in insulation
- Metal curtain wall with 1 in insulation
- Wall 12 in concrete with 2 in insulation on the outside
- Wall 8 in concrete with 2 in insulation on the outside
- Wall 4 in concrete with 2 in insulation on the outside
- Wall 12 in concrete with 2 in insulation on the inside
- Wall 8 in concrete with 2 in insulation on the inside
- Wall 4 in concrete with 2 in insulation on the inside
- Frame wall with 3 in insulation
- Frame wall with 2 in insulation
- Frame wall with 1 in insulation
- Frame wall without insulation
- 2 in insulation with 12 in heavyweight concrete
- 2 in insulation with 8 in heavyweight concrete
- 2 in insulation with 8 in common brick
- 2 in insulation with 8 in heavyweight concrete block
- 2 in insulation with 8 in lightweight concrete block
- 2 in insulation with 8 in clay tile
- 2 in insulation with 4 in heavyweight concrete
- 2 in insulation with 4 in common brick
- 2 in insulation with 4 in heavyweight concrete block
- 2 in insulation with 4 in lightweight concrete block
- 2 in insulation with 4 in clay tile
- 4 in face brick, 2 in insulation, 12 in heavy concrete
- 4 in face brick, 2 in insulation, 8 in heavy concrete
- 4 in face brick 2 in insulation and 8 in common brick
- 4 in face brick air space and 12 in heavyweight concrete
- 4 in face brick air space and 8 in heavyweight concrete
- 4 in face brick, 2 in insulation, 8 in heavy concrete block
- 4 in face brick, 2 in insulation, 8 in light concrete block
- 2 in face brick 2 in insulation and 8 in clay tile
- 4 in face brick 2 in insulation and 4 in heavyweight concrete
- 4 in face brick 2 in insulation and 4 in common brick
- 4 in face brick, 2 in insulation, 4 in heavy concrete block
- 4 in face brick with 8 in common brick
- 8 in heavyweight concrete block with 1 in insulation
- 8 in heavyweight concrete block

- 8 in lightweight concrete block with insulation
- 8 in lightweight concrete block
- 4 in face brick 8 in clay tile and 1 in insulation
- 4 in face brick 8 in clay tile and air space
- 4 in face brick with 8 in clay tile
- 8 in clay tile with 1 in Insulation
- 8 in clay tile with air space
- 8 in clay tile
- 4 in heavyweight concrete with 2 in insulation
- 4 in heavyweight concrete with 1 in insulation
- 4 in heavyweight concrete with air space
- 4 in heavyweight concrete
- 4 in face brick 4 in common brick and 1 in insulation
- 4 in face brick 4 in common brick and air space
- 4 in face brick with 4 in common brick
- 4 in common brick
- 4 in heavyweight concrete block
- 4 in face brick, 4 in light concrete block, 1 in insulation
- 4 in face brick 4 in lightweight concrete block and air space
- 4 in face brick with 4 in lightweight concrete block
- 4 in lightweight concrete block and 1 in insulation
- 4 in lightweight concrete block and air space
- 4 in lightweight concrete block
- 4 in face brick 4 in clay tile and 1 in insulation
- 4 in face brick 4 in clay tile and air space
- 4 in face brick and 4 in clay tile
- 4 in clay tile and 1 in insulation
- 4 in clay tile and air space
- 4 in clay tile
- Sheet metal with 1 in insulation
- Sheet metal with 2 in insulation
- Sheet metal with 3 in insulation
- 4 in insulation with 8 in lightweight concrete block
- 6 in insulation with 8 in lightweight concrete block
- 4 in insulation with 8 in clay tile
- 6 in insulation with 8 in clay tile
- 8 in heavyweight concrete with 4 in insulation
- 8 in heavyweight concrete with 6 in insulation
- 4 in insulation with 8 in common brick
- 6 in insulation with 8 in common brick
- Frame wall with 6 in insulation
- Frame wall with 8 in insulation
- Sheet metal with 6 in insulation
- Sheet metal with 8 in insulation
- Frame wall with 6 in insulation and 4 in brick veneer
- Frame wall with 12 in insulation and 4 in brick veneer
- 4 in face brick
- 4 in face brick
- 4 in face brick
- 4 in face brick
- 4 in face brick
- Metal curtain wall with 3 in insulation
- Metal curtain wall with 2 in insulation
- Metal curtain wall with 1 in insulation
- Wall 12 in concrete with 2 in insulation on the outside
- Wall 8 in concrete with 2 in insulation on the outside
- Wall 4 in concrete with 2 in insulation on the outside

- 4 in face brick with 2 in insulation
- Spandrel glass, R-10 insulation board, gyp board
- Metal wall panel, R-10 insulation board, gyp board
- Metal wall panel, sheathing, R-11 batt insulation, gyp board
- 1 in stone, R-10 insulation board, gyp board
- 1 in stone, sheathing, R-11 batt insulation, gyp board
- 1 in stucco, sheathing, R-11 batt insulation, gyp board
- 1 in stucco, 8 in heavyweight CMU, R-11 batt insulation, gyp board
- Wood siding, sheathing, batt insulation, 1/2 in wood
- EIFS finish, R-5 insulation board, sheathing, gyp board
- Synthetic stucco, R-5 plus R-11 insulation, gypsum board
- Synthetic stucco, insulation, sheathing, light concrete, gypsum
- Synthetic stucco, insulation, concrete, gypsum
- Synthetic stucco, insulation board, light concrete, gypsum
- Brick, R-5 insulation board, sheathing, gypsum
- Brick, sheathing, R-11 batt insulation, gypsum
- Brick, R-5 plus R-11 insulation with sheathing, gypsum
- Brick, R-5 insulation board, 8 in light-weight concrete block
- Brick, 8 in lightweight CMU, R-11 batt insulation, gyp board
- Brick, R-5 insulation board, 8 in heavyweight CMU, gyp board
- Brick, R-5 insulation board, brick
- Brick, R-5 insulation board, 8 in lightweight concrete, gyp board
- Brick, R-5 insulation board, 12 in heavyweight concrete, gyp board
- Brick, 8 in heavyweight concrete, R-11 batt insulation, gyp board
- 4 in lightweight concrete, R-5 board insulation, gyp board
- 4 in lightweight concrete, R-11 batt insulation, gyp board
- 4 in lightweight concrete, R-10 board insulation, 4 in lightweight concrete
- 8 in lightweight CMU, R-11 batt insulation, gyp board
- 8 in concrete block, filled, R-11 insulation, gypsum
- 8 in lightweight CMU with fill insulation
- 8 in lightweight CMU with fill insulation, gyp board
- 8 in lightweight concrete, R-11 batt insulation, gyp board
- 8 in heavyweight concrete, R-11 batt insulation, gyp board
- 12 in lightweight CMU with fill insulation, gyp board
- 12 in heavyweight concrete, R-19 batt insulation, gyp board
- 12 in heavyweight concrete
- R-0 8 in CMU wall
- R-20 8 in CMU wall
- R-0 wood frame wall
- R-11.4 8 in CMU wall
- R-13 + R10 metal frame wall
- R-13 + R13 metal frame wall
- R-13 + R3.8 wood frame wall
- R-13 + R7.5 wood frame wall
- R-13.3 8 in concrete
- R-15.2 8 in concrete
- R-5.7 8 in concrete
- R7.6 8 in concrete
- R9.5 8 in concrete
- R-0 8 in CMU under ground wall
- R7.5 8 in CMU under ground wall
- R-19 wood frame wall
- R-21 wood frame wall
- R-13 wood frame wall
- R-30 wood frame wall
- R-15 wood frame wall
- R-2.7 8 in CMU under ground wall

- R-4 8 in CMU under ground wall
- R-5.4 8 in CMU under ground wall
- R8.1 8 in CMU under ground wall
- R-10.8 8 in CMU under ground wall
- R-12.5 8 in CMU under ground wall
- R-11 wood frame wall
- R-19 8 in concrete
- R-38 wood frame wall
- R-11.4 8 in concrete
- R-13.3 8 in concrete
- R-15.2 8 in concrete
- R-13+3.8 wood frame wall
- R-13+7.5 wood frame wall
- R-0 metal frame wall
- R9 curtain wall
- R-11 UG ex-wall
- R-13 UG ex-wall
- R-15 UG ex-wall
- R-19 UG ex-wall
- R-30 8 in concrete
- 8 in concrete wall with perlite filled cores
- 8 in concrete wall with poured cores
- 8 in concrete wall hollow
- 8 in CMU with concrete poured concrete
- 8 in CMU with perlite poured concrete
- Straw bale wall
- Insulated concrete form (ICF) wall, 10" thick form
- Insulated concrete form (ICF) wall, 12" thick form
- Insulated concrete form (ICF) wall, 14" thick form
- Structurally ins. panel (SIP) wall 4 1/2 in (114 mm)
- Structurally ins. panel (SIP) wall 6 1/2 in
- Structurally ins. panel (SIP) wall 8 1/4 in (210 mm)
- Structurally ins. panel (SIP) wall 10 1/4 in (260 mm)
- Structurally ins. panel (SIP) wall 12 1/4 in (311 mm)
- R-2 CMU wall
- R-13 wood frame wall
- R-11 metal frame wall
- R-13 metal frame wall
- R-15 metal frame wall
- R-19 metal frame wall
- R-30 metal frame wall
- R-13+R13 metal frame wall
- R-15+R15 metal frame wall
- R-38 metal frame wall
- R-13+3.8 metal frame wall
- R-13+7.5 metal frame wall
- R-3 8 in CMU wall
- R-4 8 in CMU wall
- R-6 8 in concrete block
- 2 ft stone, 2 in airspace, 1 in dense plaster
- Stone, insulation, plasterboard
- Render, no-fines concrete, plasterboard
- Render, no-fines concrete, insulation, plasterboard
- Render, mineral fiber insulation, no-fines concrete, plasterboard
- 9 in solid brick, 1/2 in dense plaster
- 9 in solid brick, 1/2 in plasterboard
- 9 in solid brick, mineral fiber insulation, plasterboard

    - Render, insulation, solid brick, dense plaster
    - Render, dense concrete block, dense plaster
    - Render, dense concrete block, plasterboard
    - Render, dense concrete block, insulation, plasterboard
    - Render, insulation, dense concrete block, dense plaster
    - Dense concrete, 1 in insulation, dense concrete, dense plaster
    - Dense concrete, 1 in insulation, dense concrete, plasterboard
    - Dense concrete, 2 in insulation, dense concrete, plasterboard
    - Render, dense concrete, insulation, dense concrete, dense plaster
    - Brick, air, brick, dense plaster
    - Brick, air, brick, light-weight plaster
    - Brick, foam insulation, brick, dense plaster
    - Brick, blown fiber insulation, brick, dense plaster
    - Brick, polystyrene insulation, brick, plasterboard
    - Brick, air, dense concrete block, dense plaster
    - Brick, foam insulation, dense concrete block, dense plaster
    - Brick, blown fiber insulation, dense concrete, dense plaster
    - Brick, polystyrene insulation, dense concrete, dense plaster
    - Brick, air, light-weight concrete block, dense plaster
    - Brick, foam insulation, light-weight concrete, dense plaster
    - Brick, fiber insulation, light-weight concrete, dense plaster
    - Brick, fiber insulation, light-weight concrete, dense plaster
    - Brick, polystyrene insulation, light-weight concrete, dense plaster
    - Brick, air, plywood sheathing, studding, plasterboard
    - 1/2 in dense plaster, 8 in brick, 1/2 in dense plaster
    - 1/2 in dense plaster, dense concrete block, 1/2 in dense plaster
    - Brick, polystyrene insulation, light-weight concrete, dense plaster
    - Brick, 4 in autoclaved aerated concrete block, light-weight plaster
    - Brick, 6 in autoclaved aerated concrete block, light-weight plaster
    - Brick, insulation, autoclaved aerated concrete block, plaster
    - Brick, plywood, studding, 4 in insulation, plasterboard
    - Brick, plywood, studding, 6 in insulation, plasterboard
    - Plasterboard, concrete block, air, concrete block, plasterboard
- InteriorFloor:
    - Wilton carpet on concrete
    - Timber flooring, gypsum
    - Timber flooring, batting, gypsum
    - Timber flooring, batt, metal deck tray
    - Timber flooring, joists, plasterboard ceiling
    - Loft floor - domestic A
    - Loft floor - domestic B
    - 2 in heavyweight concrete floor deck
    - 4 in heavyweight concrete floor deck
    - 2 in lightweight concrete floor deck
    - 8 in heavyweight concrete floor deck
    - 2 in wood deck
    - 3 in wood deck
    - 8 in lightweight concrete floor deck
    - Passive floor, no insulation, tile or vinyl
    - Passive floor, no insulation, carpet or hardwood
    - Passive floor, R-2 board insulation, any cover
    - Passive floor, R-3 board insulation, any cover
    - Passive floor, R-4 board insulation, any cover
    - Passive floor, R-5 board insulation, any cover
    - Passive floor, R-6 board insulation, any cover
    - Passive floor, R-7 board insulation, any cover
    - Passive floor, R-8 board insulation, any cover

    - Passive floor, R-9 board insulation, any cover
    - Passive floor, R-10 board insulation, any cover
    - Passive floor, R-11 board insulation, any cover
    - Passive floor, R-13 board insulation, any cover
    - Passive floor, R-15 board insulation, any cover
    - Passive floor, R-19 board insulation, any cover
    - Passive floor, R-21 board insulation, any cover
    - Passive floor, R-30 board insulation, any cover
    - Passive floor, R-38 board insulation, any cover
    - Radiant floor, R-38 blanket insulation, any cover
    - Radiant floor, R-11 blanket insulation, any cover
    - Radiant floor, R-13 blanket insulation, any cover
    - Radiant floor, R-15 blanket insulation, any cover
    - Radiant floor, R-19 blanket insulation, any cover
    - Radiant floor, R-21 blanket insulation, any cover
    - Radiant floor, R-30 blanket insulation, any cover
    - Screed, concrete, dense plaster
    - Vinyl floor covering, screed, concrete
    - Carpet underlay, screed, concrete
    - Carpet, underlay, timber on joists, ventilated
    - Carpet, underlay, screed, concrete, insulation, building board
    - Vinyl, screed, concrete - A
    - Vinyl, screed, concrete - B
    - Vinyl, screed, insulation, concrete
    - Vinyl, timber, insulation, concrete
    - Vinyl, timber on joists, ventilated
    - Vinyl, timber on joists, building board - A
    - Vinyl, timber on joists, building board - B
    - Vinyl, screed, concrete, 2 in insulation, building board
    - Vinyl, screed, concrete, 4 in insulation, building board
- InteriorWall:
    - Light plaster, brick, light plaster
    - Light plaster, double brick, light plaster
    - Light plaster, heavy concrete block, light plaster
    - Light plaster, medium concrete block, light plaster
    - Light plaster, light concrete block, light plaster
    - Standard double gypsum with 4 in air gap
    - Standard double fiberboard with 4 in air gap
    - 4 in single-leaf brick (plastered both sides)
    - 8 in single-leaf brick (plastered both sides)
    - 1 1/4 ft single-leaf brick (plastered both sides)
    - Solid breeze blocks (plastered both sides)
    - 4 in single-leaf brick
    - 5 in single-leaf brickwork (plastered on one side)
    - Aerated concrete blocks
    - Hollow concrete blocks
    - Insulated concrete form
    - Glass blocks
    - 4 in reinforced concrete
    - 9 in medium-weight concrete block
    - 1 1/2 ft dense concrete
    - Polystyrene faced with hardboard on plasterboard
    - Expanded-wood chipboard
    - Block cavity wall with air gap (plastered)
    - Cast concrete cavity wall with air gap (plastered)
    - Brick cavity wall with air gap
    - Brick cavity wall (plaster both sides)

- Standard double plasterboard with insulation
- 3/8 in plasterboard on studs
- 1/2 in plasterboard on studs
- 1/2 in plasterboard on studs with mineral fiber slab
- 1/4 in plywood on studs
- 3/8 in plywood on studs
- Asbestos wallboard on timber frame
- Domestic solid party wall
- Domestic lightweight party wall
- Lightweight plasterboard partition
- Solid partition
- 4 in clay tile with plaster
- Light-weight concrete block with plaster
- Heavy-weight concrete block with plaster
- 4 in common brick with plaster
- Heavyweight concrete with plaster
- 5 in clay tile with plaster
- Light-weight concrete block plastered
- heavyweight concrete block plastered
- 8 in common brick with plaster
- 8 in heavy concrete with plaster
- 12 in heavy concrete with plaster
- 4 in clay tile
- Light-weight concrete block
- 4 in heavyweight concrete block
- 4 in common brick
- 4 in heavyweight concrete
- 8 in clay tile
- 8 in lightweight concrete block
- 8 in heavyweight concrete block
- 8 in common brick
- 8 in heavyweight concrete
- 12 in heavyweight concrete
- Frame partition with 3/4 in gypsum board
- 1 in wood
- 2 in wood
- 3 in wood
- 4 in wood
- Frame partition with 1 in wood
- 2 in furniture
- 3 in furniture
- 2 in heavyweight concrete
- Frame construction, wood sheathing, wood studs
- Frame construction, wood sheathing, metal studs
- Frame construction, R-2 board insulation, wood studs
- Frame construction, R-2 board insulation, metal studs
- Frame construction, R-3 board insulation, wood studs
- Frame construction, R-3 board insulation, metal studs
- Frame construction, R-4 board insulation, wood studs
- Frame construction, R-4 board insulation, metal studs
- Frame construction, R-5 board insulation, wood studs
- Frame construction, R-5 board insulation, wood studs
- Frame construction, R-6 board insulation, wood studs
- Frame construction, R-6 board insulation, metal studs
- Frame construction, R-11 insulation, wood studs
- Frame construction, R-11 insulation, metal studs
- Frame construction, R-11 plus R-2 insulation, wood studs

- Frame construction, R-11 plus R-2 insulation, metal studs
- Frame construction, R-11 and R-3 insulation, wood studs
- Frame construction, R-11 plus R-3 insulation, metal studs
- Frame construction, R-11 plus R-4 insulation, wood studs
- Frame construction, R-11 plus R-4 insulation, metal studs
- Frame construction, R-11 plus R-5 insulation, wood studs
- Frame construction, R-11 plus R-5 insulation, metal studs
- Frame construction, R-11 plus R-6 insulation, wood studs
- Frame construction, R-11 plus R-6 insulation, metal studs
- Frame construction, R-15 insulation, wood sheathing, wood studs
- Frame construction, R-15 insulation, wood sheathing, metal studs
- Frame construction, R-15 plus R-2 insulation, wood studs
- Frame construction, R-15 plus R-2 insulation, metal studs
- Frame construction, R-15 plus R-3 insulation, wood studs
- Frame construction, R-15 plus R-3 insulation, metal studs
- Frame construction, R-15 plus R-4 insulation, wood studs
- Frame construction, R-15 plus R-4 insulation, metal studs
- Frame construction, R-15 plus R-5 insulation, wood studs
- Frame construction, R-15 plus R-5 insulation, metal studs
- Frame construction, R-15 plus R-6 insulation, wood studs
- Frame construction, R-15 plus R-6 insulation, metal studs
- Frame construction, R-21 insulation, wood sheathing, wood studs
- Frame construction, R-21 insulation, wood sheathing, metal studs
- Frame construction, R-21 plus R-2 insulation, wood studs
- Frame construction, R-21 plus R-2 insulation, metal studs
- Frame construction, R-21 plus R-3 insulation, wood studs
- Frame construction, R-21 plus R-3 insulation, metal studs
- Frame construction, R-21 plus R-4 insulation, wood studs
- Frame construction, R-21 plus R-4 insulation, metal studs
- Frame construction, R-21 plus R-5 insulation, wood studs
- Frame construction, R-21 plus R-5 insulation, metal studs
- Frame construction, R-21 plus R-6 insulation, wood studs
- Frame construction, R-21 plus R-6 insulation, metal studs
- Siding, R-2 insulation, interior finish
- Siding, R-2 insulation, filled core, interior finish
- Siding, R-3 insulation, interior finish
- Siding, R-3 insulation, filled core, interior finish
- Siding, R-4 insulation, interior finish
- Siding, R-4 insulation, filled core, interior finish
- Siding, R-5 insulation, interior finish
- Siding, R-5 insulation, filled core, interior finish
- Siding, R-6 insulation, interior finish
- Siding, R-6 insulation, filled core, plus interior finish
- Siding, R-10 insulation, interior finish
- Siding, R-10 insulation, filled core, interior finish
- Siding, R-15 insulation, interior finish
- Siding, R-15 insulation, filled core, interior finish
- Block, interior/exterior finish, R-11 plus R-2 insulation
- Block, interior/exterior finish, R-11 plus R-2 insulation, filled
- Block, interior/exterior finish, R-11 plus R-3 insulation
- Block, interior/exterior finish, R-11 plus R-3 insulation, filled
- Block, interior/exterior finish, R-11 plus R-4 insulation
- Block, interior/exterior finish, R-11 plus R-4 insulation, filled
- Block, interior/exterior finish, R-11 plus R-5 insulation
- Block, interior/exterior finish, R-11 plus R-5 insulation, filled
- Block, interior/exterior finish, R-15 plus R-2 insulation
- Block, interior/exterior finish, R-15 plus R-2 insulation, filled

    - Block, interior/exterior finish, R-15 plus R-3 insulation
    - Block, interior/exterior finish, R-15 plus R-3 insulation, filled
    - Block, interior/exterior finish, R-15 plus R-4 insulation
    - Block, interior/exterior finish, R-15 plus R-4 insulation, filled
    - Block, interior/exterior finish, R-15 plus R-5 insulation
    - Block, interior/exterior finish, R-15 plus R-5 insulation, filled
    - Block, interior/exterior finish, R-21 plus R-2 insulation
    - Block, interior/exterior finish, R-21 plus R-2 insulation, filled
    - Block, interior/exterior finish, R-21 plus R-3 insulation
    - Block, interior/exterior finish, R-21 plus R-3 insulation, filled
    - Block, interior/exterior finish, R-21 plus R-4 insulation
    - Block, interior/exterior finish, R-21 plus R-4 insulation, filled
    - Block, interior/exterior finish, R-21 plus R-5 insulation
    - Block, interior/exterior finish, R-21 plus R-5 insulation, filled
    - Light-weight plaster, brick, light-weight plaster
    - Light-weight plaster, concrete block, light-weight plaster
    - Plasterboard, timber studding, plasterboard
- NonSlidingDoor:
    - Wooden
    - Metal
    - Timber flush-panel hollow-core
    - Solid hardwood
    - Hollow core wood
    - Door - wood - hollow core - wood storm
    - Hollow core wood, metal storm
    - Solid core wood
    - Solid core wood, wood storm
    - Solid core wood, metal storm
    - Wood panel
    - Wood panel with wood storm
    - Wood panel, metal storm
    - Metal, fiberglass core
    - Metal, fiberglass core, storm
    - Wood frame with single clear glass
    - Metal frame with single clear glass
    - Wood frame, single glass door, glass storm
    - Metal frame, single glass door, glass storm
    - Wood frame, double glass door
    - Metal frame, double glass door
    - Wood frame, double/triple glass, glass storm
    - Metal frame, double/triple glass, glass storm
    - French door, wood frame with single glass
    - French door, metal frame with single glass
    - French door, wood frame with double glass
    - French door, metal frame with double glass
    - French door, wood frame with triple glass
    - French door, metal frame with triple glass
- Roof:
    - Flat roof - A
    - Flat roof - B
    - Flat roof - C
    - Sloping roof including loft
    - Sloping roof including loft
    - Lightweight curtain roof
    - Lightweight curtain roof
    - Sloping roof - domestic
    - Un-insulated flat roof

- Super-insulated flat roof
- Roof terrace system
- Roof terrace system
- Steel sheet with 2 in insulation
- Steel sheet with 1 in insulation
- Steel sheet with 2 in insulation
- Steel sheet with 1 in insulation
- Steel sheet with 4 in insulation
- Steel sheet with 8 in insulation
- Steel sheet with 12 in insulation
- Stone chipping, asphalt, screed, heavy concrete block
- Stone chipping, asphalt, screed, light concrete block
- Asphalt, screed, dense cast concrete, dense plaster
- Asphalt, aerated concrete slab, dense plaster
- Asphalt, fiberboard, aced, air, aced
- Asphalt, fiberboard, gypsum
- Asphalt, fiberboard, 1 in batting, gypsum
- Asphalt, fiberboard, 2 in batting, gypsum
- 3/4 in asphalt 1/2 in fiberboard 1 in air 3 in batt 3/8 in gyp.
- 3/4 in asphalt 1/2 in fiberboard 2 in EPS slab 1 in air 3/8 in gyp.
- 3/4 in asphalt 1/2 in fiberboard 2 in EPS slab 1 in air 3/8 in gyp.
- 3/4 in asphalt 1/2 in screed 2 in wood wool slab 1 in air 3/8 in gyp.
- 3/4 in felt / bitumen 1 in EPS slab 1/8 in metal deck
- 4 in wood with 2 in insulation
- 2 1/2 in wood with 2 in insulation
- 4 in wood with 2 in insulation
- 4 in wood with 1 in insulation
- 2 1/2 in wood with 1 in insulation
- 1 in wood with 1 in insulation
- 8 in lightweight concrete
- 6 in lightweight concrete
- 4 in lightweight concrete
- 6 in heavyweight concrete with 2 in insulation
- 4 in heavyweight concrete with 2 in insulation
- 2 in heavyweight concrete with 2 in insulation
- 6 in heavyweight concrete with 1 in insulation
- 4 in heavyweight concrete with 1 in insulation
- 2 in heavyweight concrete with 1 in insulation
- 4 in wood with 2 in insulation
- 2 1/2 in wood with 2 in insulation
- 1 in wood with 2 in insulation
- 4 in wood with 1 in insulation
- 2 1/2 in wood with 1 in insulation
- 1 in wood with 1 in insulation
- 8 in lightweight concrete
- 6 in lightweight concrete
- 4 in lightweight concrete
- 6 in heavyweight concrete with 2 in insulation
- 4 in heavyweight concrete with 2 in insulation
- 2 in heavyweight concrete with 2 in insulation
- 6 in heavyweight concrete with 1 in insulation
- 4 in heavyweight concrete with 1 in insulation
- 2 in heavyweight concrete with 1 in insulation
- 2 in heavyweight concrete with 4 in insulation
- 4 in heavyweight concrete with 4 in insulation
- 6 in heavyweight concrete with 4 in insulation
- 6 in heavyweight concrete with 6 in insulation

- 6 in heavyweight concrete with 9 in insulation
- 6 in heavyweight concrete with 12 in insulation
- 4 in wood with 4 in insulation
- 4 in wood with 8 in insulation
- 4 in wood with 12 in insulation
- Concrete ballast, membrane, sheathing, insulation, metal deck
- Asphalt shingles, wood sheathing, R-19 batt insulation, gyp board
- Slate or tile, wood sheathing, R-19 batt insulation, gyp board
- Wood shingles, wood sheathing, R-19 batt insulation, gyp board
- Metal roof, R-19 batt insulation, gyp board
- Metal roof, R-19 batt insulation, suspended acoustical ceiling
- Metal roof, R-19 batt insulation
- Membrane, sheathing, R-10 insulation board, wood deck
- Membrane, sheathing, R-10 insulation, wood deck, suspended ceiling
- Membrane, sheathing, R-10 insulation board, metal deck
- Membrane, sheathing, R-10 insulation, metal deck, suspended ceiling
- Membrane, sheathing, R-15 insulation board, metal deck
- Membrane, sheathing, R-10 plus R-15 insulation boards, metal deck
- Membrane, sheathing, R-15 insulation, 4 in light concrete
- Membrane, sheathing, R-15 insulation, 6 in light concrete
- Membrane, sheathing, R-15 insulation, 8 in light concrete
- Membrane, sheathing, R-15 insulation, 6 in heavy concrete
- Membrane, sheathing, R-15 insulation, 8 in heavy concrete
- Membrane, concrete, R-19 insulation, suspended ceiling
- R-10 over roof deck
- R-15 over roof deck
- R-19 wood framed roof
- R-20 over roof deck
- R-25 over roof deck
- R-30 wood frame roof
- R-38 wood frame roof
- R-49 wood frame roof
- R-60 wood frame roof
- R-30 over roof deck
- R-15 over roof deck - cool roof
- R-20 over roof deck - cool roof
- R-18.7 over roof deck
- R-30 over roof deck - cool roof
- R-18.7 over roof deck - cool roof
- R-38 over roof deck
- R-38 over roof deck-cool roof
- R-50 over roof deck
- R-50 over roof deck-cool roof
- R-13 wood frame roof
- R-22 wood frame roof
- R-26 wood frame roof
- R-43 wood frame roof
- R-52 wood frame roof
- R-11 wood frame roof
- R-15 wood frame roof
- R-0 wood or steel frame roof
- R-0 over roof deck
- R-60 over roof deck
- R-19 insulation over concret deck
- R-38 attic ceiling
- R-30 attic ceiling
- R-45 attic ceiling

    - R-11 wood frame roof
    - R-22 insulated panels
    - R-28 insulated panels
    - R-36 insulated panels
    - Ballast, 2 in polystyrene, screed, concrete, plaster
    - Ballast, 4 in polystyrene, screed, concrete, plaster
    - Waterproof covering, screed, cast concrete, dense plaster
    - Waterproof covering, polyurethane, screed, concrete, plaster
    - Waterproof covering, polyurethane, screed, concrete, plaster
    - Waterproof covering, polyurethane, screed, concrete, plaster
    - Waterproof covering, timber decking, plasterboard
    - Waterproof covering, mineral fiber insulation, plasterboard
    - Waterproof covering, 1 1/4 in polyurethane, decking, plasterboard
    - Waterproof covering, 4 in polyurethane, decking, plasterboard
    - Waterproof covering, 8 in polyurethane, decking, plasterboard
- UndergroundSlab:
    - Standard slab construction - A
    - Standard slab construction - B
    - Solid-ground floor
    - Suspended timber floor
    - Industrial solid
    - Un-insulated solid
    - Un-insulated suspended timber
    - Super-insulated
    - Slab edge uninsulated
    - Slab edge R-5 insulation
    - Slab edge R-10 insulation
    - Slab edge R-15 insulation
    - Slab edge R-20 insulation

MEP Constructions for Buildings and Spaces

Ceilings

8 in lightweight concrete ceiling — U-Value: 1.3610 W/(m² • °K)

8 in (200 mm) lightweight concrete ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in reinforced-concrete ceiling — U-Value: 3.6842 W/(m² • °K)

4 in (100 mm) reinforced-concrete ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.100 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Carpeted 4 in reinforced-concrete ceiling — U-Value: 2.2826 W/(m² • °K)

Carpeted 4 in (100 mm) reinforced-concrete ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.100 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)

8 in reinforced-concrete ceiling — U-Value: 2.9167 W/(m² • °K)

8 in (200 mm) reinforced-concrete ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.200 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

5 in reinforced-concrete ceiling (screeded) — U-Value: 2.4275 W/(m² • °K)

5 in (125 mm) reinforced-concrete ceiling (upper floor screeded)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.126 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)

5 in concrete ceiling — U-Value: 3.4146 W/(m² • °K)

5 in (125 mm) concrete ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete cast dense	Concrete cast dense	-	0.130 m	1.90 W/(m • °K)	2300	840 J/(kg •

reinforced	reinforced				kg/m³	°K)

5 in concrete ceiling (screeded)

U-Value: 2.4108 W/(m² • °K)

5 in (125 mm) concrete ceiling (2 in (50 mm) floating screed on upper floor)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.130 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)

1/2 in plaster with TG boards on 16 in joist centers

U-Value: 1.6929 W/(m² • °K)

1/2 in (12 mm) plaster ceiling with TG boards on 16 in (400 mm) joist centers

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster ceiling tiles	Plaster ceiling tiles	-	0.012 m	0.38 W/(m • °K)	1120 kg/m³	840 J/(kg • °K)

Plaster, wood boards, glass wool on joists

U-Value: 0.8226 W/(m² • °K)

1/2 in (12 mm) plaster ceiling TG boards with 1 in (25 mm) glass wool on joists

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster ceiling tiles	Plaster ceiling tiles	-	0.012 m	0.38 W/(m • °K)	1120 kg/m³	840 J/(kg • °K)
Glass fiber wool - fiber quilt	Glass fiber wool - fiber quilt	-	0.025 m	0.040 W/(m • °K)	12 kg/m³	840 J/(kg • °K)

12 in reinforced-concrete ceiling

U-Value: 2.4138 W/(m² • °K)

12 in (300 mm) reinforced-concrete ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.300 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

2 in screed, 6 in cast concrete

U-Value: 2.1993 W/(m² • °K)

Ceiling 2 in (50 mm) screed, 6 in (150 mm) cast concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.150 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Wood blocks, screed, 6 in concrete

U-Value: 1.5791 W/(m² • °K)

Ceiling 1 in (25 mm) wood blocks 2 in (50 mm) screed 6 in (150 mm) cast concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg

						• °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.150 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Wood blocks, concrete, batting, gypsum

U-Value: 0.7457 W/(m² • °K)

Ceiling, 1 in (25 mm) wood blocks, 2 1/2 in (65 mm) cast concrete, 1 in (25 mm) air, 1 in (25 mm) batting, 5/8 in (16 mm) gypsum

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.065 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-30, 9 1/2 in batt insulation	R-30, 9 1/2 in (240 mm) batt insulation	-	0.2438 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Wood blocks, concrete, batting, metal deck tray

U-Value: 0.8057 W/(m² • °K)

Ceiling 1 in (25 mm) wood blocks, 2 1/2 in (65 mm) cast concrete, 1 in (25 mm) air, 1 in (25 mm) batt, 1/16 in (2 mm) metal deck tray

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.065 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-30, 9 1/2 in batt insulation	R-30, 9 1/2 in (240 mm) batt insulation	-	0.2438 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Metal surface	Metal surface	-	0.002 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Concrete slab internal

U-Value: 1.0687 W/(m² • °K)

Concrete slab internal ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Timber-joist internal

U-Value: 1.2585 W/(m² • °K)

Timber-joist internal ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Timber-joist internal - industry

U-Value: 1.5926 W/(m² • °K)

Timber-joist internal ceiling - industry

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

2 in heavyweight concrete with false ceiling

U-Value: 1.4128 W/(m² • °K)

2 in (50 mm) heavyweight concrete deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in heavyweight concrete	2 in (50 mm) heavyweight concrete	-	0.0508 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete with false ceiling

U-Value: 1.3301 W/(m² • °K)

4 in (100 mm) heavyweight concrete deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in lightweight concrete with false ceiling

U-Value: 1.0411 W/(m² • °K)

4 in (100 mm) lightweight concrete deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

8 in heavyweight concrete with false ceiling

U-Value: 1.2337 W/(m² • °K)

8 in (200 mm) heavyweight concrete deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

8 in lightweight concrete with false ceiling

U-Value: 0.8144 W/(m² • °K)

8 in (200 mm) lightweight concrete deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

2 in wood deck with false ceiling

U-Value: 0.8985 W/(m² • °K)

2 in (50 mm) wood deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

3 in wood deck with false ceiling

U-Value: 0.7559 W/(m² • °K)

3 in (75 mm) wood deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
3 in wood	3 in (75 mm) wood	-	0.076 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

12 in heavyweight concrete with false ceiling

U-Value: 1.1504 W/(m² • °K)

12 in (300 mm) heavyweight concrete deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in wood deck with false ceiling

U-Value: 0.6524 W/(m² • °K)

4 in (100 mm) wood deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Steel deck with false ceiling

U-Value: 1.4427 W/(m² • °K)

Steel deck with false ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Steel	Steel	-	0.005 m	45 W/(m • °K)	7800 kg/m³	480 J/(kg • °K)

Ceiling below joists, no insulation

U-Value: 1.3683 W/(m² • °K)

Ceiling below joists, no insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-2 board insulation

U-Value: 1.1015 W/(m² • °K)

Ceiling below joists, R-2 board insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-3 board insulation

U-Value: 0.9255 W/(m² • °K)

Ceiling below joists, R-3 board insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-4 board insulation

U-Value: 0.7949 W/(m² • °K)

Ceiling below joists, R-4 board insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-5 board insulation

U-Value: 0.6983 W/(m² • °K)

Ceiling below joists, R-5 board insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-6 board insulation

U-Value: 0.6189 W/(m² • °K)

Ceiling below joists, R-6 board insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-8 board insulation

U-Value: 0.5110 W/(m² • °K)

Ceiling below joists, R-8 board insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-8 insulation	R-8 insulation	8 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-10 board insulation

U-Value: 0.4315 W/(m² • °K)

Ceiling below joists, R-10 board insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-10 insulation	R-10 insulation	10 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-11 blanket or loose fill

U-Value: 0.4769 W/(m² • °K)

Ceiling below joists, R-11 blanket or loose fill [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-13 blanket or loose fill

U-Value: 0.4315 W/(m² • °K)

Ceiling below joists, R-13 blanket or loose fill [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-13 insulation	R-13 insulation	13 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-15 blanket or loose fill

U-Value: 0.3917 W/(m² • °K)

Ceiling below joists, R-15 blanket or loose fill [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-19 blanket or loose fill

U-Value: 0.2895 W/(m² • °K)

Ceiling below joists, R-19 blanket or loose fill [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-19 insulation	R-19 insulation	19 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-21 blanket or loose fill

U-Value: 0.2668 W/(m² • °K)

Ceiling below joists, R-21 blanket or loose fill [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-30 blanket or loose fill

U-Value: 0.1930 W/(m² • °K)

Ceiling below joists, R-30 blanket or loose fill [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-30 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Ceiling below joists, R-38 blanket or loose fill

U-Value: 0.1646 W/(m² • °K)

Ceiling below joists, R-38 blanket or loose fill [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
R-38 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood, no insulation

U-Value: 1.6295 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood, no insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-2 insulation

U-Value: 1.0333 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-2 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-3 insulation

U-Value: 0.8744 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-3 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-

Exposed beams, 2 in cement-fiber slab, no insulation

U-Value: 0.8119 W/(m² • °K)

Ceiling on exposed beams, 2 in (50 mm) cement-fiber slab, no insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in Cement	2 in (50 mm) Cement	0.0 (m² • °K)/W	0.051 m	0.72 W/(m • °K)	1860 kg/m³	840 J/(kg • °K)
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-4 insulation

U-Value: 0.7608 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-4 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-5 insulation

U-Value: 0.6700 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-5 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-

Exposed beams, 3 in cement-fiber slab, no insulation

U-Value: 0.6472 W/(m² • °K)

Ceiling on exposed beams, 3 in (75 mm) cement-fiber slab, no insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
3 in Cement	3 in (75 mm) Cement	0.0 (m² • °K)/W	0.076 m	0.72 W/(m • °K)	1860 kg/m³	840 J/(kg • °K)
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-6 insulation

U-Value: 0.5961 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-6 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-7 insulation

U-Value: 0.5166 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-7 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-10 insulation

U-Value: 0.4201 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-10 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-10 insulation	R-10 insulation	10 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-12 insulation

U-Value: 0.3577 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-12 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-12 insulation	R-12 insulation	12 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-15 insulation

U-Value: 0.3066 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-15 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-17 to R-18 insulation

U-Value: 0.2725 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-17 to R-18 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific

						Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-19 insulation	R-19 insulation	19 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-20 insulation

U-Value: 0.2441 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-20 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-19 insulation	R-19 insulation	19 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-21 to R-23 insulation

U-Value: 0.2214 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-21 to R-23 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-24 to R-26 insulation

U-Value: 0.1987 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-24 to R-26 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-25 insulation	R-25 insulation	25 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-27 to R-29 insulation

U-Value: 0.1816 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-27 to R-29 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-28 insulation	R-28 insulation	28 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-30 to R-32 insulation

U-Value: 0.1646 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-30 to R-32 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-30 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Exposed beams, 1 1/2 in wood plus R-33 to R-35 insulation

U-Value: 0.1533 W/(m² • °K)

Ceiling on exposed beams, 1 1/2 in (40 mm) wood plus R-33 to R-35 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-34 insulation	R-34 insulation	34 (m² • °K)/W	-	-	-	-

Wood block, concrete, plasterboard

U-Value: 1.58 W/(m² • °K)

1 in (25 mm) wood block, 2 1/2 in (65 mm) cast concrete, 2 in (50 mm) airspace, 1/2 in (12 mm) plasterboard ceiling [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
2 in heavyweight concrete	2 in (50 mm) heavyweight concrete	-	0.0508 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

MEP Constructions for Buildings and Spaces

Exterior Walls

Standard wall construction - A

U-Value: 0.3495 W/(m² • °K)

Standard wall construction

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in lightweight concrete block (filled)	8 in (200 mm) lightweight concrete block (filled)	-	0.2032 m	0.26 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Standard wall construction - B

U-Value: 0.2993 W/(m² • °K)

Standard wall construction

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Standard wall construction - C

U-Value: 0.3967 W/(m² • °K)

Standard wall construction

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick / block wall

U-Value: 0.4396 W/(m² • °K)

Brick / block wall

Material	Description	R-	Thickness	Conductivity	Density	Specific

		Value				Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Timber-frame wall

U-Value: 0.4493 W/(m² • °K)

Timber-frame wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Lightweight curtain wall

U-Value: 0.4522 W/(m² • °K)

Lightweight curtain wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Metal-clad wall

U-Value: 0.4546 W/(m² • °K)

Metal-clad wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-

8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick / block wall

U-Value: 0.3967 W/(m² • °K)

Brick / block wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick / block wall

U-Value: 0.5416 W/(m² • °K)

Brick / block wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Timber-frame wall

U-Value: 0.5779 W/(m² • °K)

Timber-frame wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick / block wall

U-Value: 0.5130 W/(m² • °K)

Brick / block wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Lightweight concrete-clad wall

U-Value: 0.5445 W/(m² • °K)

Lightweight concrete-clad wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface	Inside vertical surface	0.12 (m²	-	-	-	-

resistance	resistance	• °K)/W				

Brickwork single-leaf construction dense plaster

U-Value: 2.1839 W/(m² • °K)

Brickwork single-leaf construction dense plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R0 w/ 2x4 frame	Batt, R-0 including framing factor	0.97 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Brickwork single-leaf construction light plaster

U-Value: 1.9487 W/(m² • °K)

Brickwork single-leaf construction light plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R0 w/ 2x4 frame	Batt, R-0 including framing factor	0.97 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Un-insulated brick/block wall

U-Value: 1.4269 W/(m² • °K)

Un-insulated brick/block wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 3/4 in (IN32)	Polystyrene 3/4 in (1.9 cm)	3.12 (m² • °K)/W	0.019049 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

Super-insulated external wall

U-Value: 0.2204 W/(m² • °K)

Super-insulated external wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-

1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Sheet steel

U-Value: 5.8817 W/(m² • °K)

Sheet steel

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Sheet aluminum

U-Value: 5.8821 W/(m² • °K)

Sheet aluminum

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brickwork single-leaf construction with insulation and plaster

U-Value: 0.6723 W/(m² • °K)

Brickwork single-leaf construction with insulation and plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Polyurethane insulation	Polyurethane insulation	-	0.025 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Plaster (dense)	Plaster (dense)	-	0.025 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brickwork single-leaf construction fiber insulation and render

U-Value: 0.7362 W/(m² • °K)

Brickwork single-leaf construction fiber insulation and render

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Polyurethane insulation	Polyurethane insulation	-	0.025 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brickwork single-leaf construction EPS insulation and render

U-Value: 0.5596 W/(m² • °K)

Brickwork single-leaf construction EPS insulation and render

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Expanded polystyrene (EPS)	Expanded polystyrene (EPS)	-	0.025 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Lightweight concrete block air gap and plasterboard

U-Value: 0.6825 W/(m² • °K)

Lightweight concrete block air gap and plasterboard

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

Lightweight concrete block GRP insulation and plasterboard

U-Value: 0.5602 W/(m² • °K)

Lightweight concrete block GRP insulation and plasterboard

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Polyurethane insulation	Polyurethane insulation	-	0.025 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

Lightweight concrete block poly-insulation and plasterboard

U-Value: 0.4376 W/(m² • °K)

Lightweight concrete block poly-insulation and plasterboard

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Polyurethane insulation	Polyurethane insulation	-	0.025 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

Brick cavity with dense plaster

U-Value: 1.4917 W/(m² • °K)

Brick cavity with dense plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)

Brick cavity with mineral insulation and lightweight plaster

U-Value: 0.6945 W/(m² • °K)

Brick cavity with mineral insulation and lightweight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
4 in mineral fiber insulation	4 in (100 mm) mineral fiber insulation	-	0.095 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)

Brick cavity full mineral insulation and lightweight plaster

U-Value: 0.5065 W/(m² • °K)

Brick cavity full mineral insulation and lightweight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
4 in mineral fiber insulation	4 in (100 mm) mineral fiber insulation	-	0.095 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)

Brick cavity with UF foam insulation and lightweight plaster

U-Value: 0.8543 W/(m² • °K)

Brick cavity with UF foam insulation and lightweight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Urea formaldehyde (UF) foam insulation	Urea formaldehyde (UF) foam insulation	-	0.050 m	0.040 W/(m • °K)	10 kg/m³	1400 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)

Brick, heavy concrete block, phenolic foam, light plaster

U-Value: 0.8048 W/(m² • °K)

Brick-air heavyweight concrete block and Phenolic foam and lightweight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Foam - phenol	Foam - phenol	-	- m	0.040 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brick, heavy concrete block, mineral insulation, light plaster

U-Value: 0.5359 W/(m² • °K)

Brick-air heavyweight concrete block and full mineral insulation and lightweight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
4 in mineral fiber insulation	4 in (100 mm) mineral fiber insulation	-	0.095 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brick, medium concrete block, foam insulation, light plaster

U-Value: 0.5487 W/(m² • °K)

Brick-air medium concrete block, urea formaldehyde (UF) foam insulation and light-weight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Foam - phenol	Foam - phenol	-	- m	0.040 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brick, light concrete block, foam insulation, light plaster

U-Value: 0.4646 W/(m² • °K)

Brick-air thermolite block and UF insulation and lightweight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Foam - phenol	Foam - phenol	-	- m	0.040 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brick, light concrete block, light plaster

U-Value: 0.9237 W/(m² • °K)

Brick-air lightweight concrete block and lightweight plaster

Material	Description	R-	Thickness	Conductivity	Density	Specific

		Value				Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brick, foam insulation, light concrete block, light plaster

U-Value: 0.5856 W/(m² • °K)

Brick-air UF insulation lightweight concrete block and lightweight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brick, mineral insulation, light concrete block, light plaster

U-Value: 0.3855 W/(m² • °K)

Brick mineral insulation thermolite block and lightweight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
4 in mineral fiber insulation	4 in (100 mm) mineral fiber insulation	-	0.095 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Face brick, insulation, light concrete block

U-Value: 0.5511 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 4 in (100 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation	R-10, 2 in (50 mm)	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg •

board	insulation board					°K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in lightweight concrete

U-Value: 1.1407 W/(m² • °K)

4 in (100 mm) lightweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in face brick, 8 in common brick

U-Value: 1.2100 W/(m² • °K)

4 in (100 mm) face brick, air space and 8 in (200 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick, 8 in heavyweight concrete block

U-Value: 1.4244 W/(m² • °K)

4 in (100 mm) face brick air space and 8 in (200 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick, 8 in lightweight concrete block

U-Value: 1.1562 W/(m² • °K)

4 in (100 mm) face brick air space and 8 in (200 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)

4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick air space and 8 in clay tile

U-Value: 1.1077 W/(m² • °K)

4 in (100 mm) face brick air space and 8 in (200 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick air space and 2 in heavyweight concrete

U-Value: 1.7352 W/(m² • °K)

4 in (100 mm) face brick air space and 2 in (50 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
2 in lightweight concrete roof ballast	2 in (50 mm) lightweight concrete roof ballast	-	0.0508 m	0.19 W/(m • °K)	640 kg/m³	840 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick air space and 4 in common brick

U-Value: 1.4563 W/(m² • °K)

4 in (100 mm) face brick air space and 4 in (100 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick air space and 4 in heavyweight concrete block

U-Value: 1.6013 W/(m² • °K)

4 in (100 mm) face brick air space and 4 in (100 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)

4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick air space and 4 in lightweight concrete block

U-Value: 1.2280 W/(m² • °K)

4 in (100 mm) face brick air space and 4 in (100 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

12 in heavyweight concrete

U-Value: 1.9968 W/(m² • °K)

12 in (300 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

8 in heavyweight concrete with 2 in insulation

U-Value: 0.6160 W/(m² • °K)

8 in (200 mm) heavyweight concrete with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)

8 in heavyweight concrete with 1 in insulation

U-Value: 0.9683 W/(m² • °K)

8 in (200 mm) heavyweight concrete with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)

8 in heavyweight concrete with air space

U-Value: 1.6076 W/(m² • °K)

8 in (200 mm) heavyweight concrete with air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)

8 in heavyweight concrete

U-Value: 2.2621 W/(m² • °K)

8 in (200 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)

4 in face brick 8 in common brick with 1 in insulation

U-Value: 0.8091 W/(m² • °K)

4 in (100 mm) face brick 8 in (200 mm) common brick with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Com brick 8 in (BK02)	8 in (20.3 cm) common brick	1.6 (m² • °K)/W	0.203200 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)

4 in face brick 8 in common brick with air space

U-Value: 1.2118 W/(m² • °K)

4 in (100 mm) face brick 8 in (200 mm) common brick with air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Com brick 8 in (BK02)	8 in (20.3 cm) common brick	1.6 (m² • °K)/W	0.203200 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)

4 in face brick air space and 4 in lightweight block

U-Value: 0.9866 W/(m² • °K)

4 in (100 mm) face brick air space and 4 in (100 mm) lightweight block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Wall with 3 in fiberglass insulation and stucco outside finish

U-Value: 0.4992 W/(m² • °K)

Wall with 3 in (75 mm) fiberglass insulation and stucco outside finish

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

Two-sided brick wall with air space

U-Value: 1.9894 W/(m² • °K)

Two-sided brick wall with air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
2 in lightweight concrete roof ballast	2 in (50 mm) lightweight concrete roof ballast	-	0.0508 m	0.19 W/(m • °K)	640 kg/m³	840 J/(kg • °K)

Brick wall 8 in concrete block and no air space

U-Value: 1.2320 W/(m² • °K)

Brick wall 8 in (200 mm) concrete block and no air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)

Brick wall with 4 in concrete block

U-Value: 1.8709 W/(m² • °K)

Brick wall with 4 in (100 mm) concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Brick wall with 8 in concrete block

U-Value: 1.6339 W/(m² • °K)

Brick wall with 8 in (200 mm) concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)

Brick wall with 6 in concrete

U-Value: 1.1655 W/(m² • °K)

Brick wall with 6 in (150 mm) concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Frame wall with 2 in insulation and 4 in brick veneer

U-Value: 0.6857 W/(m² • °K)

Frame wall with 2 in (50 mm) insulation and 4 in (100 mm) brick veneer

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-

Frame wall with 2 in insulation

U-Value: 0.7079 W/(m² • °K)

Frame wall with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-

Metal curtain wall with 3 in insulation

U-Value: 0.5149 W/(m² • °K)

Metal curtain wall with 3 in (75 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Metal curtain wall with 2 in insulation

U-Value: 0.7399 W/(m² • °K)

Metal curtain wall with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Metal curtain wall with 1 in insulation

U-Value: 0.6418 W/(m² • °K)

Metal curtain wall with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Wall 12 in concrete with 2 in insulation on the outside

U-Value: 0.6418 W/(m² • °K)

Wall 12 in (300 mm) concrete with 2 in (50 mm) insulation on the outside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
12 in concrete block	12 in (300 mm) concrete block	-	0.3048 m	1.4 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

Wall 8 in concrete with 2 in insulation on the outside

U-Value: 0.6669 W/(m² • °K)

Wall 8 in (200 mm) concrete with 2 in (50 mm) insulation on the outside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

Wall 4 in concrete with 2 in insulation on the outside

U-Value: 0.6941 W/(m² • °K)

Wall 4 in (100 mm) concrete with 2 in (50 mm) insulation on the outside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

Wall 12 in concrete with 2 in insulation on the inside

U-Value: 0.6418 W/(m² • °K)

Wall 12 in (300 mm) concrete with 2 in (50 mm) insulation on the inside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
12 in concrete block	12 in (300 mm) concrete block	-	0.3048 m	1.4 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
12 in concrete block	12 in (300 mm) concrete block	-	0.3048 m	1.4 W/(m • °K)	800 kg/m³	920 J/(kg • °K)

Wall 8 in concrete with 2 in insulation on the inside

U-Value: 0.6669 W/(m² • °K)

Wall 8 in (200 mm) concrete with 2 in (50 mm) insulation on the inside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)

Wall 4 in concrete with 2 in insulation on the inside

U-Value: 0.6941 W/(m² • °K)

Wall 4 in (100 mm) concrete with 2 in (50 mm) insulation on the inside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

Frame wall with 3 in insulation

U-Value: 0.4392 W/(m² • °K)

Frame wall with 3 in (75 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-

Frame wall with 2 in insulation

U-Value: 0.5931 W/(m² • °K)

Frame wall with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-

Frame wall with 1 in insulation

U-Value: 0.9130 W/(m² • °K)

Frame wall with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-

Frame wall without insulation

U-Value: 1.9818 W/(m² • °K)

Frame wall without insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-

2 in insulation with 12 in heavyweight concrete

U-Value: 0.5945 W/(m² • °K)

2 in (50 mm) insulation with 12 in (300 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
12 in concrete block	12 in (300 mm) concrete block	-	0.3048 m	1.4 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

2 in insulation with 8 in heavyweight concrete

U-Value: 0.6160 W/(m² • °K)

2 in (50 mm) insulation with 8 in (200 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg •

	block					°K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

2 in insulation with 8 in common brick

U-Value: 0.5601 W/(m² • °K)

2 in (50 mm) insulation with 8 in (200 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

2 in insulation with 8 in heavyweight concrete block

U-Value: 0.6020 W/(m² • °K)

2 in (50 mm) insulation with 8 in (200 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

2 in insulation with 8 in lightweight concrete block

U-Value: 0.4900 W/(m² • °K)

2 in (50 mm) insulation with 8 in (200 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

2 in insulation with 8 in clay tile

U-Value: 0.5371 W/(m² • °K)

2 in (50 mm) insulation with 8 in (200 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

2 in insulation with 4 in heavyweight concrete

U-Value: 0.6391 W/(m² • °K)

2 in (50 mm) insulation with 4 in (100 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

2 in insulation with 4 in common brick

U-Value: 0.6076 W/(m² • °K)

2 in (50 mm) insulation with 4 in (100 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

2 in insulation with 4 in heavyweight concrete block

U-Value: 0.6315 W/(m² • °K)

2 in (50 mm) insulation with 4 in (100 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

2 in insulation with 4 in lightweight concrete block

U-Value: 0.5639 W/(m² • °K)

2 in (50 mm) insulation with 4 in (100 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

2 in insulation with 4 in clay tile

U-Value: 0.5938 W/(m² • °K)

2 in (50 mm) insulation with 4 in (100 mm) clay tile

Material	Description	R-	Thickness	Conductivity	Density	Specific

		Value				Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick, 2 in insulation, 12 in heavy concrete

U-Value: 0.5803 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 12 in (300 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick, 2 in insulation, 8 in heavy concrete

U-Value: 0.6008 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 8 in (200 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick 2 in insulation and 8 in common brick

U-Value: 0.5475 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 8 in (200 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Com brick 8 in (BK02)	8 in (20.3 cm) common brick	1.6 (m² • °K)/W	0.203200 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
R-10, 2 in insulation	R-10, 2 in (50 mm)	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg •

board	insulation board					°K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick air space and 12 in heavyweight concrete

U-Value: 1.3852 W/(m² • °K)

4 in (100 mm) face brick air space and 12 in (300 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick air space and 8 in heavyweight concrete

U-Value: 1.5079 W/(m² • °K)

4 in (100 mm) face brick air space and 8 in (200 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick, 2 in insulation, 8 in heavy concrete block

U-Value: 0.5875 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 8 in (200 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick, 2 in insulation, 8 in light concrete block

U-Value: 0.5362 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 8 in (200 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

2 in face brick 2 in insulation and 8 in clay tile

U-Value: 0.5362 W/(m² • °K)

2 in (50 mm) face brick 2 in (50 mm) insulation and 8 in (200 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick 2 in insulation and 4 in heavyweight concrete

U-Value: 0.6227 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 4 in (100 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick 2 in insulation and 4 in common brick

U-Value: 0.5928 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 4 in (100 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick, 2 in insulation, 4 in heavy concrete block

U-Value: 0.6155 W/(m² • °K)

4 in (100 mm) face brick 2 in (50 mm) insulation and 4 in (100 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick with 8 in common brick

U-Value: 1.5499 W/(m² • °K)

4 in (100 mm) face brick with 8 in (200 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Com brick 8 in (BK02)	8 in (20.3 cm) common brick	1.6 (m² • °K)/W	0.203200 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

8 in heavyweight concrete block with 1 in insulation

U-Value: 0.9342 W/(m² • °K)

8 in (200 mm) heavyweight concrete block with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

8 in heavyweight concrete block

U-Value: 2.0846 W/(m² • °K)

8 in (200 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

8 in lightweight concrete block with insulation

U-Value: 1.5562 W/(m² • °K)

8 in (200 mm) lightweight concrete block with insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

8 in lightweight concrete block

U-Value: 0.8108 W/(m² • °K)

8 in (200 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in face brick 8 in clay tile and 1 in insulation

U-Value: 0.5255 W/(m² • °K)

4 in (100 mm) face brick 8 in (200 mm) clay tile and 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick 8 in clay tile and air space

U-Value: 1.1092 W/(m² • °K)

4 in (100 mm) face brick 8 in (200 mm) clay tile and air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick with 8 in clay tile

U-Value: 1.3859 W/(m² • °K)

4 in (100 mm) face brick with 8 in (200 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

8 in clay tile with 1 in Insulation

U-Value: 0.7867 W/(m² • °K)

8 in (200 mm) clay tile with 1 in (25 mm) Insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

8 in clay tile with air space

U-Value: 1.1622 W/(m² • °K)

8 in (200 mm) clay tile with air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

8 in clay tile

U-Value: 1.4696 W/(m² • °K)

8 in (200 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
Hol clay tile 8 in (CT04)	2 cells, 8 in (20.3cm)	1.85 (m² • °K)/W	0.203200 m	0.623065 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

4 in heavyweight concrete with 2 in insulation

U-Value: 0.6391 W/(m² • °K)

4 in (100 mm) heavyweight concrete with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete with 1 in insulation

U-Value: 1.0267 W/(m² • °K)

4 in (100 mm) heavyweight concrete with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete with air space

U-Value: 1.7752 W/(m² • °K)

4 in (100 mm) heavyweight concrete with air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete

U-Value: 2.6087 W/(m² • °K)

4 in (100 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in face brick 4 in common brick and 1 in insulation

U-Value: 0.9123 W/(m² • °K)

4 in (100 mm) face brick 4 in (100 mm) common brick and 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick 4 in common brick and air space

U-Value: 1.4589 W/(m² • °K)

4 in (100 mm) face brick 4 in (100 mm) common brick and air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick with 4 in common brick

U-Value: 1.9784 W/(m² • °K)

4 in (100 mm) face brick with 4 in (100 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in common brick

U-Value: 2.1535 W/(m² • °K)

4 in (100 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
Com brick 4 in (BK01)	4 in (10.1 cm) common brick	0.8 (m² • °K)/W	0.101585 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)

4 in heavyweight concrete block

U-Value: 2.4866 W/(m² • °K)

4 in (100 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in face brick, 4 in light concrete block, 1 in insulation

U-Value: 0.8171 W/(m² • °K)

4 in (100 mm) face brick 4 in (100 mm) lightweight concrete block and 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick 4 in lightweight concrete block and air space

U-Value: 1.2299 W/(m² • °K)

4 in (100 mm) face brick 4 in (100 mm) lightweight concrete block and air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick with 4 in lightweight concrete block

U-Value: 1.5796 W/(m² • °K)

4 in (100 mm) face brick with 4 in (100 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in lightweight concrete block and 1 in insulation

U-Value: 0.8455 W/(m² • °K)

4 in (100 mm) lightweight concrete block and 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in lightweight concrete block and air space

U-Value: 1.2954 W/(m² • °K)

4 in (100 mm) lightweight concrete block and air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in lightweight concrete block

U-Value: 1.6893 W/(m² • °K)

4 in (100 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in face brick 4 in clay tile and 1 in insulation

U-Value: 0.8816 W/(m² • °K)

4 in (100 mm) face brick 4 in (100 mm) clay tile and 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick 4 in clay tile and air space

U-Value: 1.3819 W/(m² • °K)

4 in (100 mm) face brick 4 in (100 mm) clay tile and air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick and 4 in clay tile

U-Value: 1.8394 W/(m² • °K)

4 in (100 mm) face brick and 4 in (100 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in clay tile and 1 in insulation

U-Value: 0.9147 W/(m² • °K)

4 in (100 mm) clay tile and 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

4 in clay tile and air space

U-Value: 0.9 W/(m² • °K)

4 in (100 mm) clay tile and air space

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

4 in clay tile

U-Value: 1.9899 W/(m² • °K)

4 in (100 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

Sheet metal with 1 in insulation

U-Value: 1.0630 W/(m² • °K)

Sheet metal with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Sheet metal with 2 in insulation

U-Value: 0.6530 W/(m² • °K)

Sheet metal with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Sheet metal with 3 in insulation

U-Value: 0.4712 W/(m² • °K)

Sheet metal with 3 in (75 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

4 in insulation with 8 in lightweight concrete block

U-Value: 0.3104 W/(m² • °K)

4 in (100 mm) insulation with 8 in (200 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

6 in insulation with 8 in lightweight

concrete block

U-Value: 0.2271 W/(m² • °K)

6 in (150 mm) insulation with 8 in (200 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in insulation with 8 in clay tile

U-Value: 0.22 W/(m² • °K)

4 in (100 mm) insulation with 8 in (200 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

6 in insulation with 8 in clay tile

U-Value: 0.2367 W/(m² • °K)

6 in (150 mm) insulation with 8 in (200 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

8 in heavyweight concrete with 4 in insulation

U-Value: 0.3565 W/(m² • °K)

8 in (200 mm) heavyweight concrete with 4 in (100 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in heavyweight	8 in (200 mm) heavyweight	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg •

concrete	concrete					°K)

8 in heavyweight concrete with 6 in insulation

U-Value: 0.2509 W/(m² • °K)

8 in (200 mm) heavyweight concrete with 6 in (150 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in insulation with 8 in common brick

U-Value: 0.3371 W/(m² • °K)

4 in (100 mm) insulation with 8 in (200 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Com brick 8 in (BK02)	8 in (20.3 cm) common brick	1.6 (m² • °K)/W	0.203200 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Com brick 8 in (BK02)	8 in (20.3 cm) common brick	1.6 (m² • °K)/W	0.203200 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)

6 in insulation with 8 in common brick

U-Value: 0.2411 W/(m² • °K)

6 in (150 mm) insulation with 8 in (200 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Com brick 8 in (BK02)	8 in (20.3 cm) common brick	1.6 (m² • °K)/W	0.203200 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Com brick 8 in (BK02)	8 in (20.3 cm) common brick	1.6 (m² • °K)/W	0.203200 m	0.721197 W/(m • °K)	1922.400000 kg/m³	837.360000 J/(kg • °K)

Frame wall with 6 in insulation

U-Value: 0.2470 W/(m² • °K)

Frame wall with 6 in (150 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 9 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 9 1/4 in (230 mm) including SIP wall frame factor	29.2 (m² • °K)/W	-	-	-	-
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Polystyrene 9 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 9 1/4 in (230 mm) including SIP wall frame factor	29.2 (m² • °K)/W	-	-	-	-

Frame wall with 8 in insulation

U-Value: 0.1911 W/(m² • °K)

Frame wall with 8 in (200 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 9 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 9 1/4 in (230 mm) including SIP wall frame factor	29.2 (m² • °K)/W	-	-	-	-
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Polystyrene 9 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 9 1/4 in (230 mm) including SIP wall frame factor	29.2 (m² • °K)/W	-	-	-	-

Sheet metal with 6 in insulation

U-Value: 0.2568 W/(m² • °K)

Sheet metal with 6 in (150 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 9 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 9 1/4 in (230 mm) including SIP wall frame factor	29.2 (m² • °K)/W	-	-	-	-
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Polystyrene 9 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 9 1/4 in (230 mm) including SIP wall frame factor	29.2 (m² • °K)/W	-	-	-	-

Sheet metal with 8 in insulation

U-Value: 0.1970 W/(m² • °K)

Sheet metal with 8 in (200 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Frame wall with 6 in insulation and 4 in brick veneer

U-Value: 0.2617 W/(m² • °K)

Frame wall with 6 in (150 mm) insulation and 4 in (100 mm) brick veneer

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Frame wall with 12 in insulation and 4 in brick veneer

U-Value: 0.1358 W/(m² • °K)

Frame wall with 12 in (300 mm) insulation and 4 in (100 mm) brick veneer

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick

U-Value: 0.3282 W/(m² • °K)

4 in (100 mm) face brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick

U-Value: 0.2365 W/(m² • °K)

4 in (100 mm) face brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick

U-Value: 0.1848 W/(m² • °K)

4 in (100 mm) face brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick

U-Value: 0.3338 W/(m² • °K)

4 in (100 mm) face brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in face brick

U-Value: 0.1865 W/(m² • °K)

4 in (100 mm) face brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Metal curtain wall with 3 in insulation

U-Value: 0.5131 W/(m² • °K)

Metal curtain wall with 3 in (75 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Metal curtain wall with 2 in insulation

U-Value: 0.7363 W/(m² • °K)

Metal curtain wall with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Metal curtain wall with 1 in insulation

U-Value: 1.3030 W/(m² • °K)

Metal curtain wall with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Wall 12 in concrete with 2 in insulation on the outside

U-Value: 0.6404 W/(m² • °K)

Wall 12 in (300 mm) concrete with 2 in (50 mm) insulation on the outside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
12 in lightweight concrete block	12 in (300 mm) lightweight concrete block	-	0.3048 m	0.71 W/(m • °K)	512 kg/m³	880 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

Wall 8 in concrete with 2 in insulation on the outside

U-Value: 0.6654 W/(m² • °K)

Wall 8 in (200 mm) concrete with 2 in (50 mm) insulation on the outside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

Wall 4 in concrete with 2 in insulation on the outside

U-Value: 0.6925 W/(m² • °K)

Wall 4 in (100 mm) concrete with 2 in (50 mm) insulation on the outside

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

4 in face brick with 2 in insulation

U-Value: 0.5255 W/(m² • °K)

4 in (100 mm) face brick with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

Spandrel glass, R-10 insulation board, gyp board

U-Value: 0.428 W/(m² • °K)

Spandrel glass, R-10 insulation board, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Metal wall panel, R-10 insulation board, gyp board

U-Value: 0.429 W/(m² • °K)

Metal wall panel, R-10 insulation board, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Metal wall panel, sheathing, R-11 batt insulation, gyp board

U-Value: 0.419 W/(m² • °K)

Metal wall panel, sheathing, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-

Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

1 in stone, R-10 insulation board, gyp board

U-Value: 0.428 W/(m² • °K)

1 in (25 mm) stone, R-10 insulation board, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
1 in stone	1 in (25 mm) stone	-	0.0254 m	3.17 W/(m • °K)	2560 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

1 in stone, sheathing, R-11 batt insulation, gyp board

U-Value: 0.417 W/(m² • °K)

1 in (25 mm) stone, sheathing, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
1 in stone	1 in (25 mm) stone	-	0.0254 m	3.17 W/(m • °K)	2560 kg/m³	790 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

1 in stucco, sheathing, R-11 batt insulation, gyp board

U-Value: 0.413 W/(m² • °K)

1 in (25 mm) stucco, sheathing, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

1 in stucco, 8 in heavyweight CMU, R-11 batt insulation, gyp board

U-Value: 0.414 W/(m² • °K)

1 in (25 mm) stucco, 8 in (200 mm) heavyweight CMU, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in lightweight concrete block (filled)	8 in (200 mm) lightweight concrete block (filled)	-	0.2032 m	0.26 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Wood siding, sheathing, batt insulation, 1/2 in wood

U-Value: 0.406 W/(m² • °K)

Wood siding, sheathing, batt insulation, 1/2 in (12 mm) wood [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Wood siding	Wood siding	-	0.0127 m	0.09 W/(m • °K)	592 kg/m³	1170 J/(kg • °K)
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
1/2 in wood	1/2 in (12 mm) wood	-	0.0127 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

EIFS finish, R-5 insulation board, sheathing, gyp board

U-Value: 0.668 W/(m² • °K)

EIFS finish, R-5 insulation board, sheathing, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
EIFS finish	EIFS finish	-	0.0095 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Synthetic stucco, R-5 plus R-11 insulation, gypsum board

U-Value: 0.305 W/(m² • °K)

Synthetic stucco (EIFS) finish, R-5 insulation board, sheathing, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
EIFS finish	EIFS finish	-	0.0095 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Synthetic stucco, insulation, sheathing, light concrete, gypsum

U-Value: 0.524 W/(m² • °K)

EIFS finish, R-5 insulation board, sheathing, 8 in (200 mm) lightweight CMU, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
EIFS finish	EIFS finish	-	0.0095 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
Wall air space	Wall air space resistance	0.15 (m²	-	-	-	-

resistance		• °K)/W				
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Synthetic stucco, insulation, concrete, gypsum

U-Value: 0.467 W/(m² • °K)

EIFS finish, R-10 insulation board, 8 in (200 mm) heavyweight concrete, gypsum [Source: ASHRAE]

Synthetic stucco, insulation board, light concrete, gypsum

U-Value: 0.650 W/(m² • °K)

EIFS finish, R-5 insulation board, 8 in (200 mm) lightweight concrete, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
EIFS finish	EIFS finish	-	0.0095 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, R-5 insulation board, sheathing, gypsum

U-Value: 0.571 W/(m² • °K)

Brick, R-5 insulation board, sheathing, gypsum board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, sheathing, R-11 batt insulation,

U-Value: 0.377 W/(m² • °K)

gypsum

Brick, sheathing, R-11 batt insulation, gypsum board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, R-5 plus R-11 insulation with sheathing, gypsum

U-Value: 0.283 W/(m² • °K)

Brick, R-5 insulation board, sheathing, R-11 batting insulation, gypsum board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, R-5 insulation board, 8 in light-weight concrete block

U-Value: 0.581 W/(m² • °K)

Brick, R-5 insulation board, 8 in (200 mm) lightweight CMU [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-

R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, 8 in lightweight CMU, R-11 batt insulation, gyp board

U-Value: 0.348 W/(m² • °K)

Brick, 8 in (200 mm) lightweight CMU, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
8 in lightweight concrete block	8 in (200 mm) lightweight concrete block	-	0.2032 m	0.50 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, R-5 insulation board, 8 in heavyweight CMU, gyp board

U-Value: 0.628 W/(m² • °K)

Brick, R-5 insulation board, 8 in (200 mm) heavyweight CMU, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, R-5 insulation board, brick

U-Value: 0.702 W/(m² • °K)

Brick, R-5 insulation board, brick [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface	Outside surface resistance	0.04 (m²	-	-	-	-

resistance		• °K)/W				
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, R-5 insulation board, 8 in lightweight concrete, gyp board

U-Value: 0.514 W/(m² • °K)

Brick, R-5 insulation board, 8 in (200 mm) lightweight concrete, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, R-5 insulation board, 12 in heavyweight concrete, gyp board

U-Value: 0.581 W/(m² • °K)

Brick, R-5 insulation board, 12 in (300 mm) heavyweight concrete, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)

Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

Brick, 8 in heavyweight concrete, R-11 batt insulation, gyp board

U-Value: 0.389 W/(m² • °K)

Brick, 8 in (200 mm) heavyweight concrete, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

4 in lightweight concrete, R-5 board insulation, gyp board

U-Value: 0.673 W/(m² • °K)

4 in (100 mm) lightweight concrete, R-5 board insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

4 in lightweight concrete, R-11 batt insulation, gyp board

U-Value: 0.418 W/(m² • °K)

4 in (100 mm) lightweight concrete, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
EIFS finish	EIFS finish	-	0.0095 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

4 in lightweight concrete, R-10 board insulation, 4 in lightweight concrete

U-Value: 0.434 W/(m² • °K)

4 in (100 mm) lightweight concrete, R-10 board insulation, 4 in (100 mm) lightweight concrete [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

8 in lightweight CMU, R-11 batt insulation, gyp board

U-Value: 0.383 W/(m² • °K)

8 in (200 mm) lightweight CMU, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

8 in concrete block, filled, R-11 insulation, gypsum

U-Value: 0.335 W/(m² • °K)

8 in (200 mm) light-weight concrete block (CMU) with fill insulation, R-11 batt insulation and gypsum board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in lightweight concrete block (filled)	8 in (200 mm) lightweight concrete block (filled)	-	0.2032 m	0.26 W/(m • °K)	464 kg/m³	880 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

U-Value: 1.056 W/(m² • °K)

8 in lightweight CMU with fill insulation

8 in (200 mm) lightweight CMU with fill insulation [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
12 in lightweight concrete block (filled)	12 in (300 mm) lightweight concrete block (filled)	-	0.3048 m	0.29 W/(m • °K)	512 kg/m³	880 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

8 in lightweight CMU with fill insulation, gyp board

U-Value: 0.834 W/(m² • °K)

8 in (200 mm) lightweight CMU with fill insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Wall air space resistance	Wall air space resistance	0.15 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

8 in lightweight concrete, R-11 batt insulation, gyp board

U-Value: 0.387 W/(m² • °K)

8 in (200 mm) lightweight concrete, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

8 in heavyweight concrete, R-11 batt insulation, gyp board

U-Value: 0.434 W/(m² • °K)

8 in (200 mm) heavyweight concrete, R-11 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

12 in lightweight CMU with fill insulation, gyp board

U-Value: 0.689 W/(m² • °K)

12 in (300 mm) lightweight CMU with fill insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

12 in heavyweight concrete, R-19 batt insulation, gyp board

U-Value: 0.266 W/(m² • °K)

12 in (300 mm) heavyweight concrete, R-19 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
8 in concrete block	8 in (200 mm) concrete block	-	0.2032 m	1.11 W/(m • °K)	800 kg/m³	920 J/(kg • °K)
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

12 in heavyweight concrete

U-Value: 3.122 W/(m² • °K)

12 in (300 mm) heavyweight concrete [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
8 in lightweight concrete block (filled)	8 in (200 mm) lightweight concrete block (filled)	-	0.2032 m	0.26 W/(m • °K)	464 kg/m³	880 J/(kg • °K)

Inside vertical surface resistance	Inside vertical surface resistance	0.12 (m² • °K)/W	-	-	-	-

R-0 8 in CMU wall

U-Value: 6.452772 W/(m² • °K)

ASHRAE 90.1 compliant R0 concrete or block wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R-20 8 in CMU wall

U-Value: 0.261523 W/(m² • °K)

ASHRAE 90.1 compliant R20 concrete or block wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)

R-0 wood frame wall

U-Value: 1.912221 W/(m² • °K)

ASHRAE 90.1 compliant R0 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R0 w/ 2x4 frame	Batt, R-0 including framing factor	0.97 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-11.4 8 in CMU wall

U-Value: 0.486022 W/(m² • °K)

ASHRAE 90.1 compliant R11.4 concrete or block wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Minwool Fill 3 1/2 in R11 (IN11)	R11 Fill, 3 1/2 in (8.9 cm)	10.8 (m² • °K)/W	0.088906 m	0.046730 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)

R-13 + R10 metal frame wall

U-Value: 0.331646 W/(m² • °K)

ASHRAE 90.1 compliant R13 + R10 sheathing 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.706 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13 + R13 metal frame wall

U-Value: 0.281630 W/(m² • °K)

ASHRAE 90.1 compliant R13 + R13 exterior 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 7/8 in R-3 (N21)	R-3.0 MinBd 7/8 in (2.2 cm)	3.04 (m² • °K)/W	0.022219 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.706 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13 + R3.8 wood frame wall

U-Value: 0.368868 W/(m² • °K)

ASHRAE 90.1 compliant R13 + R3.8 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Polystyrene 1 in (IN33)	Polystyrene 1 in (25 mm)	4.16 (m² • °K)/W	0.025389 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13 + R7.5 wood frame wall

U-Value: 0.290248 W/(m² • °K)

ASHRAE 90.1 compliant R13 + R7.5 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Polystyrene 2 in (IN35)	Polystyrene 2 in (3.1 cm)	8.33 (m² • °K)/W	0.050808 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13.3 8 in concrete

U-Value: 0.410167 W/(m² • °K)

ASHRAE 90.1 compliant R13.3 concrete [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Cellulose 3 1/2 in R-13 (IN13)	Cellulose 3 1/2 in (8.9 cm)	12.96 (m² • °K)/W	0.088906 m	0.038942 W/(m • °K)	48.060000 kg/m³	1381.644000 J/(kg • °K)

R-15.2 8 in concrete

U-Value: 0.384421 W/(m² • °K)

ASHRAE 90.1 compliant R15.2 concrete [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)

R-5.7 8 in concrete

U-Value: 0.882216 W/(m² • °K)

ASHRAE 90.1 compliant R5.7 concrete [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Roof Insul 2 in (IN74)	Roof Insul 2 in (3.1 cm)	5.56 (m² • °K)/W	0.050808 m	0.051922 W/(m • °K)	256.320000 kg/m³	837.360000 J/(kg • °K)

R7.6 8 in concrete

U-Value: 0.725613 W/(m² • °K)

ASHRAE 90.1 compliant R7.6 concrete [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)

R9.5 8 in concrete

U-Value: 0.932435 W/(m² • °K)

ASHRAE 90.1 compliant R9.5 concrete [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 1 1/4 in (IN34)	Polystyrene 1 1/4 in (3.2 cm)	5.21 (m² • °K)/W	0.031759 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)

R-0 8 in CMU under ground wall

U-Value: 0.179987 W/(m² • °K)

ASHRAE 90.1 compliant underground wall with proxy soil and insulation layer [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
UG surface fictitious insulation	Fictitious insulation place holder	30 (m² • °K)/W	-	-	-	-
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R7.5 8 in CMU under ground wall

U-Value: 0.179987 W/(m² • °K)

ASHRAE 90.1 compliant R7.5 concr. or block underground wall w/ soil layer and insulation layer [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
UG surface fictitious insulation	Fictitious insulation place holder	30 (m² • °K)/W	-	-	-	-
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R-19 wood frame wall

U-Value: 0.347873 W/(m² • °K)

ASHRAE 90.1 compliant R19 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 w/ 2x6 frame	Batt, R-19 including framing factor	13.89 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-21 wood frame wall

U-Value: 0.291822 W/(m² • °K)

ASHRAE 90.1 compliant R21 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Polyurethane 1/2 in (IN41)	Polyurethane 1/2 in (1.3 cm)	3.14 (m² • °K)/W	0.012710 m	0.023019 W/(m • °K)	24.030000 kg/m³	1590.984000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 w/ 2x6 frame	Batt, R-19 including framing factor	13.89 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13 wood frame wall

U-Value: 0.486858 W/(m² • °K)

ASHRAE 90.1 compliant R13 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-30 wood frame wall

U-Value: 0.212359 W/(m² • °K)

ASHRAE 90.1 compliant R30 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 w/ 2x6 frame	Batt, R-19 including framing factor	13.89 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-15 wood frame wall

U-Value: 0.321845 W/(m² • °K)

ASHRAE 90.1 compliant R15 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Insul Bd 3 in (HF-B4)	Insul Bd 3 in (7.6 cm)	10 (m² • °K)/W	0.076196 m	0.043268 W/(m • °K)	32.040000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 1/2 in (IN31)	Polystyrene 1/2 in (1.3 cm)	2.08 (m² • °K)/W	0.012710 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 3/4 in (IN32)	Polystyrene 3/4 in (1.9 cm)	3.12 (m² • °K)/W	0.019049 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-2.7 8 in CMU under ground wall

U-Value: 1.214657 W/(m² • °K)

ASHRAE 90.1 compliant underground wall with proxy soil and insulation layer [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 3/4 in (IN32)	Polystyrene 3/4 in (1.9 cm)	3.12 (m² • °K)/W	0.019049 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R-4 8 in CMU under ground wall

U-Value: 0.993618 W/(m² • °K)

ASHRAE 90.1 compliant underground wall with proxy soil and insulation layer [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 1 in (IN33)	Polystyrene 1 in (25 mm)	4.16 (m² • °K)/W	0.025389 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R-5.4 8 in CMU under ground wall

U-Value: 0.840019 W/(m² • °K)

ASHRAE 90.1 compliant underground wall with proxy soil and insulation layer [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 1 1/4 in (IN34)	Polystyrene 1 1/4 in (3.2 cm)	5.21 (m² • °K)/W	0.031759 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R8.1 8 in CMU under ground wall

U-Value: 0.574460 W/(m² • °K)

ASHRAE 90.1 compliant underground wall with proxy soil and insulation layer [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 2 in (IN35)	Polystyrene 2 in (3.1 cm)	8.33 (m² • °K)/W	0.050808 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R-10.8 8 in CMU under ground wall

U-Value: 0.474529 W/(m² • °K)

ASHRAE 90.1 compliant underground wall with proxy soil and insulation layer [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R-12.5 8 in CMU under ground wall

U-Value: 0.404166 W/(m² • °K)

ASHRAE 90.1 compliant underground wall with proxy soil and insulation layer [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 3 in (IN36)	Polystyrene 3 in (7.6 cm)	12.5 (m² • °K)/W	0.076196 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R-11 wood frame wall

U-Value: 0.528057 W/(m² • °K)

ASHRAE 90.1 compliant R11 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.32 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-19 8 in concrete

U-Value: 0.243826 W/(m² • °K)

ASHRAE 90.1 compliant R19 concrete wall R = 23.29, U = 0.0429 [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight	Conc heavyweight 140lb 8 in	0.88 (m²	0.203200 m	1.311205 W/(m	2242.800000	837.360000

140lb 8 in (CC05)	(20.3cm)	• °K)/W		• °K)	kg/m³	J/(kg • °K)
MinBd 1 in R-3 (IN22)	R-3.5 MinBd 1 in (2.5 cm)	3.47 (m² • °K)/W	0.025389 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Air Lay < 3/4 in Vert (AL11)	Air space in vertical walls	0.9 (m² • °K)/W	-	-	-	-
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-38 wood frame wall

U-Value: 0.154496 W/(m² • °K)

ASHRAE 90.1 compliant R38 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 w/ 2x6 frame	Batt, R-19 including framing factor	13.89 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-11.4 8 in concrete

U-Value: 0.526280 W/(m² • °K)

ASHRAE 90.1 compliant R11.4 concrete R=10.78 [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 2 in (IN35)	Polystyrene 2 in (3.1 cm)	8.33 (m² • °K)/W	0.050808 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Air Lay < 3/4 in Vert (AL11)	Air space in vertical walls	0.9 (m² • °K)/W	-	-	-	-
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13.3 8 in concrete

U-Value: 0.441167 W/(m² • °K)

ASHRAE 90.1 compliant R13.3 concrete R=12.87 [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)

Air Lay < 3/4 in Vert (AL11)	Air space in vertical walls	0.9 (m² • °K)/W	-	-	-	-
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-15.2 8 in concrete

U-Value: 0.379710 W/(m² • °K)

ASHRAE 90.1 compliant R15.2 concrete R=14.95 [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 3 in (IN36)	Polystyrene 3 in (7.6 cm)	12.5 (m² • °K)/W	0.076196 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Air Lay < 3/4 in Vert (AL11)	Air space in vertical walls	0.9 (m² • °K)/W	-	-	-	-
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13+3.8 wood frame wall

U-Value: 0.378982 W/(m² • °K)

ASHRAE 90.1 compliant R13+3.8 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Insul Bd 1 in (HF-B5)	Insul Bd 1 in (2 1/2 cm)	3.29 (m² • °K)/W	0.025297 m	0.043268 W/(m • °K)	91.314000 kg/m³	837.360000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13+7.5 wood frame wall

U-Value: 0.291233 W/(m² • °K)

ASHRAE 90.1 compliant R13+7.5 sheathing 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Polyurethane 1 1/4 in (IN44)	Polyurethane 1 1/4 in (3.2 cm)	7.83 (m² • °K)/W	0.031759 m	0.023019 W/(m • °K)	24.030000 kg/m³	1590.984000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-0 metal frame wall

U-Value: 3.253685 W/(m² • °K)

R0 16 in (400 mm) on center metal framed wall, typical for interior walls [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R9 curtain wall

U-Value: 0.578705 W/(m² • °K)

R9 curtain wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.75 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-11 UG ex-wall

U-Value: 0.497089 W/(m² • °K)

R11 UG ex-wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.32 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13 UG ex-wall

U-Value: 0.460414 W/(m² • °K)

R13 UG ex-wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in	Wood Sft 3/4 in (1.9 cm)	0.94 (m²	0.019049 m	0.115440 W/(m	512.640000	1381.644000

(WD01)		• °K)/W		• °K)	kg/m³	J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-15 UG ex-wall

U-Value: 0.378228 W/(m² • °K)

R15 UG ex-wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R15 w/ 2x4 frame	Batt, R-15 including framing factor	11.91 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-19 UG ex-wall

U-Value: 0.334160 W/(m² • °K)

R19 UG ex-wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 w/ 2x6 frame	Batt, R-19 including framing factor	13.89 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-30 8 in concrete

U-Value: 0.168604 W/(m² • °K)

8 in (200 mm) concrete wall with R30 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)

MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Air Lay < 3/4 in Vert (AL11)	Air space in vertical walls	0.9 (m² • °K)/W	-	-	-	-
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

8 in concrete wall with perlite filled cores

U-Value: 0.971834 W/(m² • °K)

8 in (200 mm) concrete wall with perlite filled cores [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
CMU MW 8 in PerlFill (CB33)	Perlite filled 8 in (20.3 cm)	5.84 (m² • °K)/W	0.203200 m	0.197477 W/(m • °K)	897.120000 kg/m³	837.360000 J/(kg • °K)

8 in concrete wall with poured cores

U-Value: 4.222068 W/(m² • °K)

8 in (200 mm) concrete wall with poured cores [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
CMU MW 8 in ConcFill (CB32)	Concrete filled 8 in (20.3 cm)	1.34 (m² • °K)/W	0.203200 m	0.857925 W/(m • °K)	1970.460000 kg/m³	837.360000 J/(kg • °K)

8 in concrete wall hollow

U-Value: 3.301339 W/(m² • °K)

8 in (200 mm) concrete wall hollow [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
CMU MW 8 in hollow (CB31)	Hollow 8 in (20.3 cm)	1.72 (m² • °K)/W	0.203200 m	0.670833 W/(m • °K)	849.060000 kg/m³	837.360000 J/(kg • °K)

8 in CMU with concrete poured concrete

U-Value: 2.312985 W/(m² • °K)

8 in (200 mm) concrete wall with concrete poured cores R = 2.45, U = 0.408 [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
CMU heavyweight 8 in ConcFill (CB12)	Concrete filled 8 in (20.3 cm)	0.88 (m² • °K)/W	0.203200 m	1.311032 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Air Lay < 3/4 in Vert (AL11)	Air space in vertical walls	0.9 (m² • °K)/W	-	-	-	-
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

8 in CMU with perlite poured concrete

U-Value: 1.259280 W/(m² • °K)

8 in (200 mm) concrete wall with concrete poured cores R = 4.5, U = 0.222 [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
CMU heavyweight 8 in PerlFill (CB13)	Perlite filled 8 in (20.3 cm)	2.93 (m² • °K)/W	0.203200 m	0.393223 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
Air Lay < 3/4 in Vert (AL11)	Air space in vertical walls	0.9 (m² • °K)/W	-	-	-	-
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Straw bale wall

U-Value: 0.186824 W/(m² • °K)

Straw bale, 3-string, 23 in (600 mm), R30 [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Straw bale	Straw bale, 3-string, 23 inch (600 mm)	30 (m² • °K)/W	0.584182 m	0.110594 W/(m • °K)	112.140000 kg/m³	1339.776000 J/(kg • °K)
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)

Insulated concrete form (ICF) wall, 10" thick form

U-Value: 0.207854 W/(m² • °K)

Insulated concrete form (ICF) wall, 10" thick form [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Polystyrene 3 in (IN36)	Polystyrene 3 in (7.6 cm)	12.5 (m² • °K)/W	0.076196 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
ConcLW 80lb 4 in (CC24)	ConcLW 80lb 4 in (10.2 cm)	1.6 (m² • °K)/W	0.101585 m	0.360512 W/(m • °K)	1281.600000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 3 in (IN36)	Polystyrene 3 in (7.6 cm)	12.5 (m² • °K)/W	0.076196 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Insulated concrete form (ICF) wall, 12" thick form

U-Value: 0.205809 W/(m² • °K)

Insulated concrete form (ICF) wall, 12" thick form [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Polystyrene 3 in (IN36)	Polystyrene 3 in (7.6 cm)	12.5 (m² • °K)/W	0.076196 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
ConcLW 80lb 6 in (CC25)	ConcLW 80lb 6 in (15.2 cm)	2.4 (m² • °K)/W	0.152393 m	0.360512 W/(m • °K)	1281.600000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 3 in (IN36)	Polystyrene 3 in (7.6 cm)	12.5 (m² • °K)/W	0.076196 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Insulated concrete form (ICF) wall, 14" thick form

U-Value: 0.196824 W/(m² • °K)

Insulated concrete form (ICF) wall, 14" thick form [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Polystyrene 3 in (IN36)	Polystyrene 3 in (7.6 cm)	12.5 (m² • °K)/W	0.076196 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
ConcLW 80lb 8 in (CC26)	ConcLW 80lb 8 in (20.2 cm)	3.2 (m² • °K)/W	0.203200 m	0.360512 W/(m • °K)	1281.600000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 3 in (IN36)	Polystyrene 3 in (7.6 cm)	12.5 (m² • °K)/W	0.076196 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Structurally ins. panel (SIP) wall 4 1/2 in (114 mm)

U-Value: 0.384404 W/(m² • °K)

Structurally insulated panel (SIP) wall 4 1/2 in (114 mm) thick, 48 in o.c., R-14 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Structurally ins. panel (SIP) wall 6 1/2 in

U-Value: 0.274693 W/(m² • °K)

Structurally ins. panel (SIP) 6 1/2 in (162 mm) wall, 48 in o.c., R-22 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 5 1/2 in w/48 in oc SIP wall frame	Polystyrene 5 1/2 in (140 mm) including SIP wall frame factor	18.4 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Structurally ins. panel (SIP) wall 8 1/4 in

U-Value: 0.219484 W/(m² • °K)

(210 mm)

Structurally ins. panel (SIP) wall 8 1/4 in (210 mm)thick, 48 in o.c., R-28 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 7 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 7 1/4 in (180 mm) including SIP wall frame factor	23.6 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Structurally ins. panel (SIP) wall 10 1/4 in (260 mm)

U-Value: 0.180430 W/(m² • °K)

Structurally ins. panel (SIP) wall 10 1/4 in (260 mm)thick, 48 in o.c., R-36 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 9 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 9 1/4 in (230 mm) including SIP wall frame factor	29.2 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Structurally ins. panel (SIP) wall 12 1/4 in (311 mm)

U-Value: 0.152354 W/(m² • °K)

Structurally ins. panel (SIP) wall 12 1/4 in (311 mm) thick, 48 in o.c., R-44 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Stucco 1 in (SC01)	Stucco 1 in (25 mm)	0.2 (m² • °K)/W	0.025389 m	0.721197 W/(m • °K)	2659.320000 kg/m³	837.360000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 11 1/4 in w/ 48 in oc SIP wall frame	Polystyrene 11 1/4 in (290 mm) including SIP wall frame facto	35 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)

GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-2 CMU wall

U-Value: 1.414207 W/(m² • °K)

2001 title 24 90.1 compliant R2 mass wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Polyurethane 1/2 in (IN41)	Polyurethane 1/2 in (1.3 cm)	3.14 (m² • °K)/W	0.012710 m	0.023019 W/(m • °K)	24.030000 kg/m³	1590.984000 J/(kg • °K)

R-13 wood frame wall

U-Value: 0.505679 W/(m² • °K)

2001 title 24 compliant R13 16 in (400 mm) on center wood framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-11 metal frame wall

U-Value: 1.033300 W/(m² • °K)

2001 title 24 compliant R11 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R11 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.433 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13 metal frame wall

U-Value: 0.984399 W/(m² • °K)

2001 title 24 compliant R13 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R13 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.706 (m² • °K)/W	-	-	-	-

GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-15 metal frame wall

U-Value: 0.949186 W/(m² • °K)

2001 title 24 compliant R15 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R15 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.92 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-19 metal frame wall

U-Value: 0.784597 W/(m² • °K)

2001 title 24 compliant R19 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R19 w/ Mtl frame	Batt, R-19 including mtl framing factor	6.175 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-30 metal frame wall

U-Value: 0.329428 W/(m² • °K)

2001 title 24 compliant R30 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Insul Bd 3 in (HF-B4)	Insul Bd 3 in (7.6 cm)	10 (m² • °K)/W	0.076196 m	0.043268 W/(m • °K)	32.040000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 w/ Mtl frame	Batt, R-19 including mtl framing factor	6.175 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13+R13 metal frame wall

U-Value: 0.542130 W/(m² • °K)

2001 title 24 compliant R13+R13 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)

Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R13 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.706 (m² • °K)/W	-	-	-	-
Minwool batt R13 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.706 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-15+R15 metal frame wall

U-Value: 0.520848 W/(m² • °K)

2001 title 24 compliant R15+R15 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R15 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.92 (m² • °K)/W	-	-	-	-
Minwool batt R15 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.92 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-38 metal frame wall

U-Value: 0.234538 W/(m² • °K)

2001 title 24 compliant R38 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool Fill 5 1/2 in R19 (IN12)	R19 Fill, 5 1/2 in (13.4 cm)	16.97 (m² • °K)/W	0.139683 m	0.046730 W/(m • °K)	10.092600 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 w/ Mtl frame	Batt, R-19 including mtl framing factor	6.175 (m² • °K)/W	-	-	-	-
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13+3.8 metal frame wall

U-Value: 0.624802 W/(m² • °K)

2001 title 24 compliant R13+3.8 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Insul Bd 1 in (HF-B5)	Insul Bd 1 in (2 1/2 cm)	3.29 (m² • °K)/W	0.025297 m	0.043268 W/(m • °K)	91.314000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R13 w/	Batt, R-11 including mtl	4.706	-	-	-	-

Mtl frame	framing factor	(m² • °K)/W				
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-13+7.5 metal frame wall

U-Value: 0.417444 W/(m² • °K)

2001 title 24 compliant R13+7.5 16 in (400 mm) on center metal framed wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Polyurethane 1 1/4 in (IN44)	Polyurethane 1 1/4 in (3.2 cm)	7.83 (m² • °K)/W	0.031759 m	0.023019 W/(m • °K)	24.030000 kg/m³	1590.984000 J/(kg • °K)
Minwool batt R13 w/ Mtl frame	Batt, R-11 including mtl framing factor	4.706 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-3 8 in CMU wall

U-Value: 1.417857 W/(m² • °K)

2004 Oregon compliant U 0.3 (R-3)mass wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 3/4 in (IN32)	Polystyrene 3/4 in (1.9 cm)	3.12 (m² • °K)/W	0.019049 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)

R-4 8 in CMU wall

U-Value: 1.125575 W/(m² • °K)

2004 Oregon compliant U 0.21 (R-4) mass wall [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Polystyrene 1 in (IN33)	Polystyrene 1 in (25 mm)	4.16 (m² • °K)/W	0.025389 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)

R-6 8 in concrete block

U-Value: 0.794961 W/(m² • °K)

2004 Oregon compliant U 0.16 (R-6) mass wall. 8 in (200 mm) concrete block (CMU) [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Polyurethane 1 in (IN43)	Polyurethane 1 in (25 mm)	6.26 (m² • °K)/W	0.025389 m	0.023019 W/(m • °K)	24.030000 kg/m³	1590.984000 J/(kg • °K)

2 ft stone, 2 in airspace, 1 in dense plaster

U-Value: 1.23 W/(m² • °K)

2 ft (600 mm) stone, 2 in (50 mm) airspace, 1 in (25 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hard stone (unspecified)	Hard stone (unspecified)	-	0.600 m	3.49 W/(m • °K)	2880 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plaster (dense)	Plaster (dense)	-	0.025 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Stone, insulation, plasterboard

U-Value: 0.65 W/(m² • °K)

2 ft (600 mm) stone, 2 in (50 mm) airspace, 1 in (25 mm) EPS insulation, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hard stone (unspecified)	Hard stone (unspecified)	-	0.600 m	3.49 W/(m • °K)	2880 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Expanded polystyrene (EPS)	Expanded polystyrene (EPS)	-	0.025 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Render, no-fines concrete, plasterboard

U-Value: 1.50 W/(m² • °K)

3/4 in (19 mm) render, 9 in (225 mm) no-fines concrete, 2 in (50 mm) airspace, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
No-fines concrete	No-fines concrete	-	0.220 m	0.96 W/(m • °K)	1800 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Render, no-fines concrete, insulation, plasterboard

U-Value: 0.52 W/(m² • °K)

3/4 in (19 mm) render, 9 in (225 mm) no-fines concrete, 2 in (50 mm) mineral fiber insulation between battens, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
No-fines concrete	No-fines concrete	-	0.220 m	0.96 W/(m • °K)	1800 kg/m³	840 J/(kg • °K)
Mineral fiber insulation	Mineral fiber insulation	-	0.050 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Render, mineral fiber insulation, no-fines concrete, plasterboard

U-Value: 0.48 W/(m² • °K)

3/4 in (19 mm) render, 2 in (50 mm) mineral fiber insulation between battens, 9 in (225 mm) no-fines concrete, 2 in (50 mm) airspace, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
Mineral fiber insulation	Mineral fiber insulation	-	0.050 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
No-fines concrete	No-fines concrete	-	0.220 m	0.96 W/(m • °K)	1800 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

9 in solid brick, 1/2 in dense plaster

U-Value: 2.14 W/(m² • °K)

9 in (225 mm) solid brick, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

9 in solid brick, 1/2 in plasterboard

U-Value: 1.43 W/(m² • °K)

9 in (225 mm) solid brick, 2 in (50 mm) airspace, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

9 in solid brick, mineral fiber insulation, plasterboard

U-Value: 0.51 W/(m² • °K)

9 in (225 mm) solid brick, 2 in (50 mm) mineral fiber insulation between battens, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Mineral fiber insulation	Mineral fiber insulation	-	0.050 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Render, insulation, solid brick, dense plaster

U-Value: 0.49 W/(m² • °K)

3/4 in (19 mm) render, 2 in (50 mm) EPS insulation, 9 in (225 mm) solid brick, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-	Thickness	Conductivity	Density	Specific

		Value				Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
2 in Expanded polystyrene (EPS)	2 in (50 mm) Expanded polystyrene (EPS)	-	0.050 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Brick	Brick	-	0.220 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Render, dense concrete block, dense plaster

U-Value: 2.73 W/(m² • °K)

3/4 in (19 mm) render, 8 in (200 mm) dense concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Render, dense concrete block, plasterboard

U-Value: 1.68 W/(m² • °K)

3/4 in (19 mm) render, 8 in (200 mm) dense concrete block, 2 in (50 mm) airspace, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Render, dense concrete block, insulation, plasterboard

U-Value: 0.71 W/(m² • °K)

3/4 in (19 mm) render, 8 in (200 mm) dense concrete block, 1 in (25 mm) polyurethane insulation, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
Polyurethane insulation	Polyurethane insulation	-	0.025 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Render, insulation, dense concrete block, dense plaster

U-Value: 0.56 W/(m² • °K)

3/4 in (19 mm) render, 2 in (50 mm) mineral fiber insulation between battens, 8 in (200 mm) dense concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
Mineral fiber insulation	Mineral fiber insulation	-	0.050 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Dense concrete, 1 in insulation, dense concrete, dense plaster

U-Value: 0.95 W/(m² • °K)

3 in (75 mm) dense concrete, 1 in (25 mm) EPS insulation, 4 in (100 mm) dense concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Dense concrete	Dense concrete	-	0.080 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
Expanded polystyrene (EPS)	Expanded polystyrene (EPS)	-	0.025 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
4 in dense concrete	4 in (100 mm) dense concrete	-	0.100 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Dense concrete, 1 in insulation, dense concrete, plasterboard

U-Value: 0.78 W/(m² • °K)

3 in (75 mm) dense concrete, 1 in (25 mm) EPS insulation, 4 in (100 mm) dense concrete, 2 in (50 mm) airspace, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Dense concrete	Dense concrete	-	0.080 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
Expanded polystyrene (EPS)	Expanded polystyrene (EPS)	-	0.025 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
4 in dense concrete	4 in (100 mm) dense concrete	-	0.100 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Dense concrete, 2 in insulation, dense concrete, plasterboard

U-Value: 0.55 W/(m² • °K)

3 in (75 mm) dense concrete, 2 in (50 mm) EPS insulation, 4 in (100 mm) dense concrete, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

Dense concrete	Dense concrete	-	0.080 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
2 in Expanded polystyrene (EPS)	2 in (50 mm) Expanded polystyrene (EPS)	-	0.050 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
4 in dense concrete	4 in (100 mm) dense concrete	-	0.100 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Render, dense concrete, insulation, dense concrete, dense plaster

U-Value: 0.56 W/(m² • °K)

3/4 in (19 mm) render, 3 in (75 mm) dense concrete, 2 in (50 mm) EPS insulation, 4 in (100 mm) dense concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
External render	External render	-	0.019 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
Dense concrete	Dense concrete	-	0.080 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
2 in Expanded polystyrene (EPS)	2 in (50 mm) Expanded polystyrene (EPS)	-	0.050 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
4 in dense concrete	4 in (100 mm) dense concrete	-	0.100 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, air, brick, dense plaster

U-Value: 1.47 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 4 in (100 mm) brick, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, air, brick, light-weight plaster

U-Value: 1.36 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 4 in (100 mm) brick, 1/2 in (12 mm) lightweight plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Brick, foam insulation, brick, dense plaster

U-Value: 0.57 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) UF foam insulation, 4 in (100 mm) brick, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Urea formaldehyde (UF) foam insulation	Urea formaldehyde (UF) foam insulation	-	0.050 m	0.040 W/(m • °K)	10 kg/m³	1400 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, blown fiber insulation, brick, dense plaster

U-Value: 0.57 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) blown fiber insulation, 4 in (100 mm) brick, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Blown fiber insulation	Blown fiber insulation	-	0.050 m	0.040 W/(m • °K)	12 kg/m³	840 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, polystyrene insulation, brick, plasterboard

U-Value: 0.79 W/(m² • °K)

4 in (100 mm) brick, 1 in (25 mm) EPS insulation, 4 in (100 mm) brick, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Expanded polystyrene (EPS)	Expanded polystyrene (EPS)	-	0.025 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Brick, air, dense concrete block, dense plaster

U-Value: 1.75 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 4 in (100 mm) dense concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)

4 in dense concrete	4 in (100 mm) dense concrete	-	0.100 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, foam insulation, dense concrete block, dense plaster

U-Value: 0.61 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) urea formaldehyde (UF) foam insulation, 4 in (100 mm) dense concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Urea formaldehyde (UF) foam insulation	Urea formaldehyde (UF) foam insulation	-	0.050 m	0.040 W/(m • °K)	10 kg/m³	1400 J/(kg • °K)
4 in dense concrete	4 in (100 mm) dense concrete	-	0.100 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, blown fiber insulation, dense concrete, dense plaster

U-Value: 0.61 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) blown fiber insulation, 4 in (100 mm) dense concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Blown fiber insulation	Blown fiber insulation	-	0.050 m	0.040 W/(m • °K)	12 kg/m³	840 J/(kg • °K)
4 in dense concrete	4 in (100 mm) dense concrete	-	0.100 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, polystyrene insulation, dense concrete, dense plaster

U-Value: 0.55 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) EPS insulation, 4 in (100 mm) dense concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
2 in Expanded polystyrene (EPS)	2 in (50 mm) Expanded polystyrene (EPS)	-	0.050 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
4 in dense concrete	4 in (100 mm) dense concrete	-	0.100 m	1.70 W/(m • °K)	2200 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, air, light-weight concrete block, dense plaster

U-Value: 0.96 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 4 in (100 mm) lightweight aggregate concrete block, 1/2 in (12 mm) dense plaster [Source:

CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, foam insulation, light-weight concrete, dense plaster

U-Value: 0.47 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) UF foam insulation, 4 in (100 mm) lightweight aggregate concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Urea formaldehyde (UF) foam insulation	Urea formaldehyde (UF) foam insulation	-	0.050 m	0.040 W/(m • °K)	10 kg/m³	1400 J/(kg • °K)
Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, fiber insulation, light-weight concrete, dense plaster

U-Value: 0.47 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) blown fiber insulation, 4 in (100 mm) lightweight aggregate concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Blown fiber insulation	Blown fiber insulation	-	0.050 m	0.040 W/(m • °K)	12 kg/m³	840 J/(kg • °K)
Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, fiber insulation, light-weight concrete, dense plaster

U-Value: 0.30 W/(m² • °K)

4 in (100 mm) brick, 4 in (100 mm) blown fiber insulation, 4 in (100 mm) lightweight aggregate concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
4 in Blown fiber insulation	4 in (100 mm) Blown fiber insulation	-	0.100 m	0.040 W/(m • °K)	12 kg/m³	840 J/(kg • °K)

Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, polystyrene insulation, light-weight concrete, dense plaster

U-Value: 0.44 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) EPS insulation, 4 in (100 mm) lightweight aggregate concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
2 in Expanded polystyrene (EPS)	2 in (50 mm) Expanded polystyrene (EPS)	-	0.050 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, air, plywood sheathing, studding, plasterboard

U-Value: 1.13 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 3/4 in (19 mm) plywood sheathing, 4 in (100 mm) studding, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plywood Sheathing	Plywood Sheathing	-	0.019 m	0.14 W/(m • °K)	530 kg/m³	1800 J/(kg • °K)
Timber studding	Timber studding	-	0.095 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
1/2 in plasterboard	1/2 in (12 mm) plasterboard	-	0.013 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

1/2 in dense plaster, 8 in brick, 1/2 in dense plaster

U-Value: 1.57 W/(m² • °K)

1/2 in (12 mm) dense plaster, 8 in (200 mm) brick, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
8 in brick	8 in (200 mm) brick	-	0.215 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

1/2 in dense plaster, dense concrete block, 1/2 in dense plaster

U-Value: 2.36 W/(m² • °K)

1/2 in (12 mm) dense plaster, 8 in (200 mm) dense concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)
8 in concrete block (dense)	8 in (200 mm) concrete block (dense)	-	0.215 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, polystyrene insulation, light-weight concrete, dense plaster

U-Value: 0.57 W/(m² • °K)

4 in (100 mm) brick, 1 in (25 mm) airspace, 1 in (25 mm) EPS insulation, 4 in (100 mm) lightweight aggregate concrete block, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1 in external wall airspace	1 in (25 mm) external wall airspace	0.18 (m² • °K)/W	0.025 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Expanded polystyrene (EPS)	Expanded polystyrene (EPS)	-	0.025 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Brick, 4 in autoclaved aerated concrete block, light-weight plaster

U-Value: 1.07 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 4 in (100 mm) autoclaved aerated concrete block (density 700 kgm3), 1/2 in (12 mm) lightweight plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Autoclaved Aerated concrete block (density 700)	Autoclaved Aerated concrete block (density 700)	-	0.100 m	0.27 W/(m • °K)	700 kg/m³	1050 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Brick, 6 in autoclaved aerated concrete block, light-weight plaster

U-Value: 0.71 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 6 in (150 mm) autoclaved aerated concrete (AAC) block (density 500 kgm3), 1/2 in (12 mm) lightweight plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)

Autoclaved Aerated concrete block (density 500)	Autoclaved Aerated concrete block (density 500)	-	0.150 m	0.18 W/(m • °K)	500 kg/m³	1050 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Brick, insulation, autoclaved aerated concrete block, plaster

U-Value: 0.47 W/(m² • °K)

4 in (100 mm) brick, 1 in (25 mm) airspace, 1 in (25 mm) EPS insulation, 6 in (150 mm) autoclaved aerated concrete block (density500 kgm), 1/2 in (12 mm) lightweight plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
1 in external wall airspace	1 in (25 mm) external wall airspace	0.18 (m² • °K)/W	0.025 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Expanded polystyrene (EPS)	Expanded polystyrene (EPS)	-	0.025 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Autoclaved Aerated concrete block (density 500)	Autoclaved Aerated concrete block (density 500)	-	0.150 m	0.18 W/(m • °K)	500 kg/m³	1050 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Brick, plywood, studding, 4 in insulation, plasterboard

U-Value: 0.29 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 3/4 in (19 mm) plywood sheathing, 4 in (100 mm) studding, 4 in (100 mm) mineral fiber insulation between studs, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plywood Sheathing	Plywood Sheathing	-	0.019 m	0.14 W/(m • °K)	530 kg/m³	1800 J/(kg • °K)
Timber studding	Timber studding	-	0.095 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
4 in mineral fiber insulation	4 in (100 mm) mineral fiber insulation	-	0.095 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
1/2 in plasterboard	1/2 in (12 mm) plasterboard	-	0.013 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Brick, plywood, studding, 6 in insulation, plasterboard

U-Value: 0.21 W/(m² • °K)

4 in (100 mm) brick, 2 in (50 mm) airspace, 3/4 in (19 mm) plywood sheathing, 6 in (150 mm) studding, 6 in (150 mm) mineral fiber insulation between studs, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
External wall airspace	External wall airspace	0.18 (m² • °K)/W	0.050 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)

Plywood Sheathing	Plywood Sheathing	-	0.019 m	0.14 W/(m • °K)	530 kg/m³	1800 J/(kg • °K)
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
6 in mineral fiber insulation	6 in (150 mm) mineral fiber insulation	-	0.140 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
1/2 in plasterboard	1/2 in (12 mm) plasterboard	-	0.013 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Plasterboard, concrete block, air, concrete block, plasterboard

U-Value: 0.62 W/(m² • °K)

1/2 in (12 mm) plasterboard on battens, 4 in (100 mm) lightweight aggregate concrete block, 3 in (75 mm) airspace, 4 in (100 mm) lightweight aggregate concrete block, 1/2 in (12 mm) plasterboard on battens [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
3 in external wall airspace	3 in (75 mm) external wall airspace	0.18 (m² • °K)/W	0.075 m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

MEP Constructions for Buildings and Spaces

Floors

Wilton carpet on concrete

U-Value: 1.2908 W/(m² • °K)

1/2 in (12 mm) Wilton carpet, 1/2 in (12 mm) cellular rubber underlay, 2 in (50 mm) screed, 6 in (150 mm) cast concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
Cellulose 5 1/2 in R-20 (IN14)	Cellulose 5 1/2 in (13.4 cm)	20.37 (m² • °K)/W	0.139683 m	0.038942 W/(m • °K)	48.060000 kg/m³	1381.644000 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.150 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Timber flooring, gypsum

U-Value: 1.8135 W/(m² • °K)

Ceiling, 3/8 in (10 mm) timber flooring, 8 in (200 mm) air, 5/8 in (16 mm) gypsum

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Timber flooring, batting, gypsum

U-Value: 0.8500 W/(m² • °K)

Ceiling, 3/8 in (10 mm) timber flooring, 8 in (200 mm) air, 1 in (25 mm) batt, 5/8 in (16 mm) gypsum

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-30, 9 1/2 in batt insulation	R-30, 9 1/2 in (240 mm) batt insulation	-	0.2438 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Timber flooring, batt, metal deck tray

U-Value: 0.9290 W/(m² • °K)

Ceiling, 3/8 in (10 mm) timber flooring, 1 in (25 mm) air, 1 in (25 mm) batting, 1/16 in (2 mm) metal deck tray

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-30, 9 1/2 in batt	R-30, 9 1/2 in (240 mm)	-	0.2438 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg •

insulation	batt insulation					°K)
Metal surface	Metal surface	-	0.002 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Timber flooring, joists, plasterboard ceiling

U-Value: 1.88 W/(m² • °K)

3/4 in (19 mm) timber flooring or chipboard on 4 in (100 mm) joists, 1/2 in (12 mm) plasterboard ceiling

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Loft floor - domestic A

U-Value: 0.3596 W/(m² • °K)

Loft floor - domestic

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Loft floor - domestic B

U-Value: 0.2481 W/(m² • °K)

Loft floor - domestic

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

2 in heavyweight concrete floor deck

U-Value: 4.3599 W/(m² • °K)

2 in (50 mm) heavyweight concrete floor deck

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in heavyweight concrete	2 in (50 mm) heavyweight concrete	-	0.0508 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete floor deck

U-Value: 3.8651 W/(m² • °K)

4 in (100 mm) heavyweight concrete floor deck

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

2 in lightweight concrete floor deck

U-Value: 3.7475 W/(m² • °K)

2 in (50 mm) lightweight concrete floor deck

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in lightweight concrete	2 in (50 mm) lightweight	-	0.051 m	0.53 W/(m • °K)	1280	840 J/(kg •

	concrete				kg/m³	°K)

8 in heavyweight concrete floor deck

U-Value: 3.1500 W/(m² • °K)

8 in (200 mm) heavyweight concrete floor deck

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

2 in wood deck

U-Value: 1.6133 W/(m² • °K)

2 in (50 mm) wood deck

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

3 in wood deck

U-Value: 1.2052 W/(m² • °K)

3 in (75 mm) wood deck

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
3 in wood	3 in (75 mm) wood	-	0.076 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

8 in lightweight concrete floor deck

U-Value: 1.3610 W/(m² • °K)

8 in (200 mm) lightweight concrete floor deck

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

Passive floor, no insulation, tile or vinyl

U-Value: 2.9582 W/(m² • °K)

Passive floor, no insulation, tile or vinyl [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Slate or tile	Slate or tile	-	0.0127 m	1.59 W/(m • °K)	1920 kg/m³	1260 J/(kg • °K)
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-

Passive floor, no insulation, carpet or hardwood

U-Value: 2.1860 W/(m² • °K)

Passive floor, no insulation, carpet or hardwood [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-

Passive floor, R-2 board insulation, any cover

U-Value: 1.3967 W/(m² • °K)

Passive floor, R-2 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-

Passive floor, R-3 board insulation, any cover

U-Value: 1.1072 W/(m² • °K)

Passive floor, R-3 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-

Passive floor, R-4 board insulation, any cover

U-Value: 0.9198 W/(m² • °K)

Passive floor, R-4 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-

Passive floor, R-5 board insulation, any cover

U-Value: 0.7892 W/(m² • °K)

Passive floor, R-5 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-

Passive floor, R-6 board insulation, any cover

U-Value: 0.6870 W/(m² • °K)

Passive floor, R-6 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-

Passive floor, R-7 board insulation, any cover

U-Value: 0.6132 W/(m² • °K)

Passive floor, R-7 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-7 insulation	R-7 insulation	7 (m² • °K)/W	-	-	-	-

Passive floor, R-8 board insulation, any cover

U-Value: 0.5507 W/(m² • °K)

Passive floor, R-8 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-8 insulation	R-8 insulation	8 (m² • °K)/W	-	-	-	-

Passive floor, R-9 board insulation, any cover

U-Value: 0.4996 W/(m² • °K)

Passive floor, R-9 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-9 insulation	R-9 insulation	9 (m² • °K)/W	-	-	-	-

Passive floor, R-10 board insulation, any cover

U-Value: 0.4599 W/(m² • °K)

Passive floor, R-10 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-10 insulation	R-10 insulation	10 (m² • °K)/W	-	-	-	-

Passive floor, R-11 board insulation, any cover

U-Value: 0.4485 W/(m² • °K)

Passive floor, R-11 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-

Passive floor, R-13 board insulation, any cover

U-Value: 0.3861 W/(m² • °K)

Passive floor, R-13 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-13 insulation	R-13 insulation	13 (m² • °K)/W	-	-	-	-

Passive floor, R-15 board insulation, any cover

U-Value: 0.3463 W/(m² • °K)

Passive floor, R-15 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-

Passive floor, R-19 board insulation, any cover

U-Value: 0.2839 W/(m² • °K)

Passive floor, R-19 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-19 insulation	R-19 insulation	19 (m² • °K)/W	-	-	-	-

Passive floor, R-21 board insulation, any cover

U-Value: 0.2668 W/(m² • °K)

Passive floor, R-21 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Passive floor, R-30 board insulation, any cover

U-Value: 0.1987 W/(m² • °K)

Passive floor, R-30 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-30 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Passive floor, R-38 board insulation, any cover

U-Value: 0.1703 W/(m² • °K)

Passive floor, R-38 board insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-38 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Radiant floor, R-38 blanket insulation, any cover

U-Value: 0.1760 W/(m² • °K)

Radiant floor, R-38 blanket insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-38 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Radiant floor, R-11 blanket insulation, any cover

U-Value: 0.4996 W/(m² • °K)

Radiant floor, R-11 blanket insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-

Radiant floor, R-13 blanket insulation, any cover

U-Value: 0.4315 W/(m² • °K)

Radiant floor, R-13 blanket insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-13 insulation	R-13 insulation	13 (m² • °K)/W	-	-	-	-

Radiant floor, R-15 blanket insulation, any cover

U-Value: 0.3804 W/(m² • °K)

Radiant floor, R-15 blanket insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-

Radiant floor, R-19 blanket insulation, any cover

U-Value: 0.3122 W/(m² • °K)

Radiant floor, R-19 blanket insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-19 insulation	R-19 insulation	19 (m² • °K)/W	-	-	-	-

Radiant floor, R-21 blanket insulation, any cover

U-Value: 0.2839 W/(m² • °K)

Radiant floor, R-21 blanket insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Radiant floor, R-30 blanket insulation, any cover

U-Value: 0.2157 W/(m² • °K)

Radiant floor, R-30 blanket insulation, any cover [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-30 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

Screed, concrete, dense plaster

U-Value: 2.38 W/(m² • °K)

2 in (50 mm) screed, 6 in (150 mm) cast concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Screed	Screed	-	0.05 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Vinyl floor covering, screed, concrete

U-Value: 0 W/(m² • °K)

Vinyl floor covering, 3 in (75 mm) screed, 6 in (150 mm) cast concrete [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
AbsVinyl tile (AV01)	AbsVinyl tile	0.05 (m² • °K)/W	-	-	-	-
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)

6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Carpet underlay, screed, concrete

U-Value: 0 W/(m² • °K)

3/8 in (10 mm) carpet underlay, 3 in (75 mm) screed, 6 in (150 mm) cast concrete [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
carpet/underlay - polyurethane board cellular	carpet/underlay - polyurethane board cellular	-	0.010 m	0.023 W/(m • °K)	24 kg/m³	1590 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Carpet, underlay, timber on joists, ventilated

U-Value: 0 W/(m² • °K)

3/8 in (10 mm) carpet with underlay, 3/4 in (19 mm) timber or chipboard on 4 in (100 mm) joists, ventilated underfloor cavity [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
carpet/underlay - polyurethane board cellular	carpet/underlay - polyurethane board cellular	-	0.010 m	0.023 W/(m • °K)	24 kg/m³	1590 J/(kg • °K)
3/4 in chipboard	3/4 in (19 mm) chipboard	-	0.019 m	0.067 W/(m • °K)	430 kg/m³	1260 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-

Carpet, underlay, screed, concrete, insulation, building board

U-Value: 0.28 W/(m² • °K)

3/8 in (10 mm) carpet/underlay, 2 in (50 mm) screed, 6 in (150 mm) cast concrete, 4 in (100 mm) mineral fiber insulation between battens, 1/2 in (12 mm) cementitious building board on underside [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
carpet/underlay - polyurethane board cellular	carpet/underlay - polyurethane board cellular	-	0.010 m	0.023 W/(m • °K)	24 kg/m³	1590 J/(kg • °K)
Screed	Screed	-	0.05 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.150 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Asbestos cement building board	Asbestos cement building board	-	0.012 m	0.6 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)

Vinyl, screed, concrete - A

U-Value: 2.01 W/(m² • °K)

Vinyl floor covering, 2 in (50 mm) screed, 6 in (150 mm) cast concrete [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
AbsVinyl tile (AV01)	AbsVinyl tile	0.05 (m² • °K)/W	-	-	-	-
Screed	Screed	-	0.05 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Vinyl, screed, concrete - B

U-Value: 1.77 W/(m² • °K)

Vinyl floor covering, 2 in (50 mm) screed, 6 in (150 mm) cast concrete [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
AbsVinyl tile (AV01)	AbsVinyl tile	0.05 (m² • °K)/W	-	-	-	-
Screed	Screed	-	0.05 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Vinyl, screed, insulation, concrete

U-Value: 0 W/(m² • °K)

Vinyl floor covering, 3 in (75 mm) screed, 2 in (50 mm) extruded polystyrene insulation, 6 in (150 mm) cast concrete [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
AbsVinyl tile (AV01)	AbsVinyl tile	0.05 (m² • °K)/W	-	-	-	-
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Polystyrene 2 in (IN35)	Polystyrene 2 in (3.1 cm)	8.33 (m² • °K)/W	0.050808 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Vinyl, timber, insulation, concrete

U-Value: 0 W/(m² • °K)

Vinyl floor covering, 3/4 in (19 mm) timber or chipboard, 2 in (50 mm) extruded polystyrene insulation, 6 in (150 mm) cast concrete [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
AbsVinyl tile (AV01)	AbsVinyl tile	0.05 (m² • °K)/W	-	-	-	-
3/4 in chipboard	3/4 in (19 mm) chipboard	-	0.019 m	0.067 W/(m • °K)	430 kg/m³	1260 J/(kg • °K)
Polystyrene 2 in (IN35)	Polystyrene 2 in (3.1 cm)	8.33 (m² • °K)/W	0.050808 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Vinyl, timber on joists, ventilated

U-Value: 0 W/(m² • °K)

Vinyl floor covering, 3/4 in (19 mm) timber or chipboard on 4 in (100 mm) joists, ventilated underfloor cavity [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
AbsVinyl tile (AV01)	AbsVinyl tile	0.05 (m² • °K)/W	-	-	-	-
3/4 in chipboard	3/4 in (19 mm) chipboard	-	0.019 m	0.067 W/(m • °K)	430 kg/m³	1260 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-

Vinyl, timber on joists, building board - A

U-Value: 1.52 W/(m² • °K)

Vinyl floor covering, 3/4 in (19 mm) timber or chipboard on 4 in (100 mm) joists, 1/2 in (12 mm) cementitious building board on underside [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
carpet/underlay - polyurethane board cellular	carpet/underlay - polyurethane board cellular	-	0.010 m	0.023 W/(m • °K)	24 kg/m³	1590 J/(kg • °K)
3/4 in chipboard	3/4 in (19 mm) chipboard	-	0.019 m	0.067 W/(m • °K)	430 kg/m³	1260 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Vinyl, timber on joists, building board - B

U-Value: 1.38 W/(m² • °K)

Vinyl floor covering, 3/4 in (19 mm) timber or chipboard on 4 in (100 mm) joists, 1/2 in (12 mm) cementitious building board on underside [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
carpet/underlay - polyurethane board cellular	carpet/underlay - polyurethane board cellular	-	0.010 m	0.023 W/(m • °K)	24 kg/m³	1590 J/(kg • °K)
3/4 in chipboard	3/4 in (19 mm) chipboard	-	0.019 m	0.067 W/(m • °K)	430 kg/m³	1260 J/(kg • °K)
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Vinyl, screed, concrete, 2 in insulation, building board

U-Value: 0.50 W/(m² • °K)

Vinyl floor covering, 2 in (50 mm) screed, 6 in (150 mm) cast concrete, 2 in (50 mm) mineral fiber insulation between battens, 1/2 in (12 mm) cementitious building board on underside [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
AbsVinyl tile (AV01)	AbsVinyl tile	0.05 (m² • °K)/W	-	-	-	-
Screed	Screed	-	0.05 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.150 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Asbestos cement building board	Asbestos cement building board	-	0.012 m	0.6 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)

Vinyl, screed, concrete, 4 in insulation, building board

U-Value: 0.29 W/(m² • °K)

Vinyl floor covering, 2 in (50 mm) screed, 6 in (150 mm) cast concrete, 4 in (100 mm) mineral fiber insulation between battens, 1/2 in (12 mm) cementitious building board on underside [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
AbsVinyl tile (AV01)	AbsVinyl tile	0.05 (m² • °K)/W	-	-	-	-
Screed	Screed	-	0.05 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.150 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Asbestos cement building board	Asbestos cement building board	-	0.012 m	0.6 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)

MEP Constructions for Buildings and Spaces

Interior Walls

Light plaster, brick, light plaster

U-Value: 1.6896 W/(m² • °K)

1/2 in (12 mm) light-weight plaster, 4 in (100 mm) brick, 1/2 in (12 mm) light-weight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Light plaster, double brick, light plaster

U-Value: 1.0625 W/(m² • °K)

1/2 in (12 mm) light-weight plaster, 4 in (100 mm) brick, 1 in (25 mm) air, 4 in (100 mm) brick, 1/2 in (12 mm) light-weight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Face brick 4 in (BK05)	4 in (10.1cm) face brick	0.44 (m² • °K)/W	0.101585 m	1.311205 W/(m • °K)	2082.600000 kg/m³	921.096000 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Light plaster, heavy concrete block, light plaster

U-Value: 2.0668 W/(m² • °K)

1/2 in (12 mm) light-weight plaster, 4 in (100 mm) heavy-weight concrete block, 1/2 in (12 mm) light-weight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Light plaster, medium concrete block, light plaster

U-Value: 1.6166 W/(m² • °K)

1/2 in (12 mm) light-weight plaster, 4 in (100 mm) medium-weight concrete block, 1/2 in (12 mm) light-weight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in heavyweight	4 in (100 mm) heavyweight	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg •

concrete	concrete					°K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Light plaster, light concrete block, light plaster

U-Value: 1.0539 W/(m² • °K)

1/2 in (12 mm) light-weight plaster, 4 in (100 mm) light-weight concrete block, 1/2 in (12 mm) light-weight plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Standard double gypsum with 4 in air gap

U-Value: 1.3289 W/(m² • °K)

1 in (25 mm) gypsum, 4 in (100 mm) air, 1 in (25 mm) gypsum

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Gypsum lightweight agg 1 in (GP05)	Gypsum lightweight agg 1 in (25 mm)	0.63 (m² • °K)/W	0.025389 m	0.230188 W/(m • °K)	720.900000 kg/m³	837.360000 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Gypsum lightweight agg 1 in (GP05)	Gypsum lightweight agg 1 in (25 mm)	0.63 (m² • °K)/W	0.025389 m	0.230188 W/(m • °K)	720.900000 kg/m³	837.360000 J/(kg • °K)

Standard double fiberboard with 4 in air gap

U-Value: 1.1905 W/(m² • °K)

1/2 in (12 mm) fiberboard, 4 in (100 mm) air, 1/2 in (12 mm) fiberboard

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)

4 in single-leaf brick (plastered both sides)

U-Value: 1.9709 W/(m² • °K)

4 in (100 mm) single-leaf brick (plastered both sides)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

8 in single-leaf brick (plastered both sides)

U-Value: 1.4433 W/(m² • °K)

8 in (200 mm) single-leaf brick (plastered both sides)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

1 1/4 ft single-leaf brick (plastered both sides)

U-Value: 1.1080 W/(m² • °K)

1 1/4 ft (400 mm) single-leaf brick (plastered both sides)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Solid breeze blocks (plastered both sides)

U-Value: 1.1789 W/(m² • °K)

Solid breeze blocks (plastered both sides)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

4 in single-leaf brick

U-Value: 2.2448 W/(m² • °K)

4 in (100 mm) single-leaf brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)

5 in single-leaf brickwork (plastered on one side)

U-Value: 2.0302 W/(m² • °K)

5 in (125 mm) single-leaf brickwork (plastered on one side)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Brick - brickwork inner leaf	Brick - brickwork inner leaf	-	0.115 m	0.62 W/(m • °K)	1700 kg/m³	800 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Aerated concrete blocks

U-Value: 1.4778 W/(m² • °K)

Aerated concrete blocks

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Autoclaved Aerated concrete block (density 700)	Autoclaved Aerated concrete block (density 700)	-	0.100 m	0.27 W/(m • °K)	700 kg/m³	1050 J/(kg • °K)

Hollow concrete blocks

U-Value: 1.2718 W/(m² • °K)

Hollow concrete blocks

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Insulated concrete form

U-Value: 0.8554 W/(m² • °K)

Insulated concrete form

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in lightweight concrete block	6 in (150 mm) lightweight concrete block	-	0.1524 m	0.49 W/(m • °K)	512 kg/m³	880 J/(kg • °K)

Glass blocks

U-Value: 2.4823 W/(m² • °K)

Glass blocks

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete cast glass reinforced	Concrete cast glass reinforced	-	- m	0.90 W/(m • °K)	1950 kg/m³	840 J/(kg • °K)

4 in reinforced concrete

U-Value: 3.0172 W/(m² • °K)

4 in (100 mm) reinforced concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

9 in medium-weight concrete block

U-Value: 1.4464 W/(m² • °K)

9 in (225 mm) medium-weight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block mediumweight 9 in	Concrete block mediumweight 9 in	-	0.220 m	0.77 W/(m • °K)	1900 kg/m³	840 J/(kg • °K)

1 1/2 ft dense concrete

U-Value: 1.6204 W/(m² • °K)

1 1/2 ft dense concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

Polystyrene faced with hardboard on plasterboard

U-Value: 0.7987 W/(m² • °K)

1 in (25 mm) polystyrene faced with 1/8 in (3 mm) hardboard on 3/8 in (10 mm) plasterboard

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 1 in (IN33)	Polystyrene 1 in (25 mm)	4.16 (m² • °K)/W	0.025389 m	0.034615 W/(m • °K)	28.836000 kg/m³	1214.172000 J/(kg • °K)
Hardboard	Hardboard	-	0.003 m	0.08 W/(m • °K)	600 kg/m³	2000 J/(kg • °K)
3/8 in plasterboard	3/8 in (10 mm) plasterboard	-	0.009 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Expanded-wood chipboard

U-Value: 2.8846 W/(m² • °K)

1/2 in (12 mm) expanded-wood chipboard

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Chipboard	Chipboard	-	0.013 m	0.067 W/(m • °K)	430 kg/m³	1260 J/(kg • °K)

Block cavity wall with air gap (plastered)

U-Value: 1.3381 W/(m² • °K)

8 in (200 mm) block-cavity wall with 2 in (50 mm) air gap (plastered)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Cast concrete cavity wall with air gap (plastered)

U-Value: 1.1684 W/(m² • °K)

8 in (200 mm) cast concrete cavity wall with 2 in (50 mm) air gap (plastered)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in heavyweight	4 in (100 mm) heavyweight	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg •

concrete	concrete					°K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

Brick cavity wall with air gap

U-Value: 1.2331 W/(m² • °K)

4 in (100 mm) brick cavity wall with 2 in (50 mm) air gap

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in lightweight concrete	2 in (50 mm) lightweight concrete	-	0.051 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
2 in lightweight concrete	2 in (50 mm) lightweight concrete	-	0.051 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

Brick cavity wall (plaster both sides)

U-Value: 1.1519 W/(m² • °K)

4 in (100 mm) brick cavity wall with 1/2 in (12 mm) (plaster both sides)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
2 in lightweight concrete	2 in (50 mm) lightweight concrete	-	0.051 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
2 in lightweight concrete	2 in (50 mm) lightweight concrete	-	0.051 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Standard double plasterboard with insulation

U-Value: 0.9662 W/(m² • °K)

Two 1/2 in (12 mm) plasterboard leaves with 1 in (25 mm) glass wool in cavity

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
Glass fiber wool - fiber quilt	Glass fiber wool - fiber quilt	-	0.025 m	0.040 W/(m • °K)	12 kg/m³	840 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

3/8 in plasterboard on studs

U-Value: 1.8100 W/(m² • °K)

3/8 in (10 mm) plasterboard on 2 in (50 mm) by 4 in (100 mm) studs at 16 in (400 mm) centers

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
3/8 in plasterboard	3/8 in (10 mm) plasterboard	-	0.009 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
1/2 in wood	1/2 in (12 mm) wood	-	0.0127 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg •

						°K)

1/2 in plasterboard on studs

U-Value: 1.6598 W/(m² • °K)

1/2 in (12 mm) plasterboard on 2 in (50 mm) by 4 in (100 mm) studs at 16 in (400 mm) centers

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
1/2 in wood	1/2 in (12 mm) wood	-	0.0127 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

1/2 in plasterboard on studs with mineral fiber slab

U-Value: 0.7594 W/(m² • °K)

1/2 in (12 mm) plasterboard on studs at 16 in (400 mm) centers with 1 in (25 mm) mineral fiber slab

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
1/2 in wood	1/2 in (12 mm) wood	-	0.0127 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Mineral fiber insulation	Mineral fiber insulation	-	0.025 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)

1/4 in plywood on studs

U-Value: 1.9231 W/(m² • °K)

1/4 in (6 mm) plywood on 2 in (50 mm) by 2 in (50 mm) studs at 2 ft (600 mm) centers

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1/4 in plywood	1/4 in (6 mm) plywood	-	0.006 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
1/2 in wood	1/2 in (12 mm) wood	-	0.0127 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Mineral fiber insulation	Mineral fiber insulation	-	0.025 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)

3/8 in plywood on studs

U-Value: 1.7857 W/(m² • °K)

3/8 in (10 mm) plywood on 2 in (50 mm) by 2 in (50 mm) and 1 in (25 mm) by 2 in studs at 18 in centers 2 in (50 mm) apart

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
3/8 in plywood	3/8 in (10 mm) plywood	-	0.009 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
1/2 in wood	1/2 in (12 mm) wood	-	0.0127 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Mineral fiber insulation	Mineral fiber insulation	-	0.025 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)

Asbestos wallboard on timber frame

U-Value: 2.1127 W/(m² • °K)

Asbestos wallboard on 1 1/4 in (32 mm) timber frame 8 in (200 mm) apart

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asbestos fiber	Asbestos fiber	-	0.010 m	0.06 W/(m • °K)	640 kg/m³	840 J/(kg •

						°K)
Timber flooring	Timber flooring	-	0.030 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Domestic solid party wall

U-Value: 1.4572 W/(m² • °K)

Domestic solid party wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Domestic lightweight party wall

U-Value: 1.1905 W/(m² • °K)

Domestic lightweight party wall

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

Lightweight plasterboard partition

U-Value: 1.5936 W/(m² • °K)

Lightweight plasterboard partition

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Solid partition

U-Value: 1.1658 W/(m² • °K)

Solid partition

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

4 in clay tile with plaster

U-Value: 1.4778 W/(m² • °K)

4 in (100 mm) clay tile with 3/4 in (19 mm) plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Hol clay tile 4 in (CT02)	1 cell, 4 in (10.1cm)	1.11 (m² • °K)/W	0.101585 m	0.519047 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

Light-weight concrete block with plaster

U-Value: 1.3053 W/(m² • °K)

4 in (100 mm) lightweight concrete block with 3/4 in (19 mm) plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

Heavy-weight concrete block with plaster

U-Value: 1.7352 W/(m² • °K)

4 in (100 mm) heavyweight concrete block with 3/4 in (19 mm) plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

4 in common brick with plaster

U-Value: 1.5662 W/(m² • °K)

4 in (100 mm) common brick with 3/4 in (19 mm) plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

Heavyweight concrete with plaster

U-Value: 1.7938 W/(m² • °K)

4 in (100 mm) heavyweight concrete with 3/4 in (19 mm) plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

5 in clay tile with plaster

U-Value: 1.3866 W/(m² • °K)

5 in (125 mm) clay tile with 3/4 in (19 mm) plaster

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Clay tile 4 in (HF-C1)	4 in (10.1 cm) clay tile	1.01 (m² • °K)/W	0.101585 m	0.571143 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

Light-weight concrete block plastered

U-Value: 0.9676 W/(m² • °K)

8 in (200 mm) lightweight concrete block plastered both sides

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

heavyweight concrete block plastered

U-Value: 1.5294 W/(m² • °K)

8 in (200 mm) heavyweight concrete block plastered both sides

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

8 in common brick with plaster

U-Value: 1.2849 W/(m² • °K)

8 in (200 mm) common brick plastered Both Sides

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

8 in heavy concrete with plaster

U-Value: 1.6228 W/(m² • °K)

8 in (200 mm) heavy concrete plastered both sides

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

12 in heavy concrete with plaster

U-Value: 1.4816 W/(m² • °K)

12 in (300 mm) heavy concrete plastered both sides

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Cmt plaster 3/4 in (CM03)	Plaster with sand aggregate, 3/4 in (19 mm)	0.2 (m² • °K)/W	0.019 m	0.721197 W/(m • °K)	1858.320000 kg/m³	837.360000 J/(kg • °K)

4 in clay tile

U-Value: 2.2835 W/(m² • °K)

4 in (100 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Clay tile 4 in (HF-C1)	4 in (10.1 cm) clay tile	1.01 (m² • °K)/W	0.101585 m	0.571143 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

Light-weight concrete block

U-Value: 1.8962 W/(m² • °K)

4 in (100 mm) light-weight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in heavyweight concrete block

U-Value: 2.9625 W/(m² • °K)

4 in (100 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in common brick

U-Value: 2.5015 W/(m² • °K)

4 in (100 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in heavyweight concrete

U-Value: 3.1375 W/(m² • °K)

4 in (100 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in heavyweight concrete	4 in (100 mm) heavyweight concrete	-	0.1016 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

8 in clay tile

U-Value: 1.6237 W/(m² • °K)

8 in (200 mm) clay tile

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Clay tile 8 in (HF-C6)	8 in (20.3 cm) clay tile	2.02 (m² • °K)/W	0.203200 m	0.571143 W/(m • °K)	1121.400000 kg/m³	837.360000 J/(kg • °K)

8 in lightweight concrete block

U-Value: 1.2583 W/(m² • °K)

8 in (200 mm) lightweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

8 in heavyweight concrete block

U-Value: 2.4090 W/(m² • °K)

8 in (200 mm) heavyweight concrete block

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

8 in common brick

U-Value: 1.8536 W/(m² • °K)

8 in (200 mm) common brick

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

8 in heavyweight concrete

U-Value: 2.6493 W/(m² • °K)

8 in (200 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

12 in heavyweight concrete

U-Value: 2.2926 W/(m² • °K)

12 in (300 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
12 in heavyweight concrete	12 in (300 mm) heavyweight concrete	-	0.3048 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

Frame partition with 3/4 in gypsum board

U-Value: 1.4733 W/(m² • °K)

Frame partition with 3/4 in (19 mm) gypsum board

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.32 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)

1 in wood

U-Value: 2.1280 W/(m² • °K)

1 in (25 mm) wood

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

2 in wood

U-Value: 1.4709 W/(m² • °K)

2 in (50 mm) wood

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

3 in wood

U-Value: 1.1239 W/(m² • °K)

3 in (75 mm) wood

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood 3 in (HF-B1)	Wood 3 in (7.6 cm)	3.57 (m²	0.076196 m	0.121151 W/(m	592.740000	837.360000

		• °K)/W		• °K)	kg/m³	J/(kg • °K)

4 in wood

U-Value: 0.9094 W/(m² • °K)

4 in (100 mm) wood

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Frame partition with 1 in wood

U-Value: 1.1630 W/(m² • °K)

Frame partition with 1 in (25 mm) wood

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

2 in furniture

U-Value: 0.7815 W/(m² • °K)

2 in (50 mm) furniture

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

3 in furniture

U-Value: 0.5884 W/(m² • °K)

3 in (75 mm) furniture

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood 3 in (HF-B1)	Wood 3 in (7.6 cm)	3.57 (m² • °K)/W	0.076196 m	0.121151 W/(m • °K)	592.740000 kg/m³	837.360000 J/(kg • °K)

2 in heavyweight concrete

U-Value: 3.4559 W/(m² • °K)

2 in (50 mm) heavyweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in heavyweight concrete	2 in (50 mm) heavyweight concrete	-	0.051 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

Frame construction, wood sheathing, wood studs

U-Value: 1.4365 W/(m² • °K)

Frame construction, no cavity insulation, no board insulation, wood sheathing, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-

6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, wood sheathing, metal studs

U-Value: 1.7885 W/(m² • °K)

Frame construction, no cavity insulation, no board insulation, wood sheathing, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-2 board insulation, wood studs

U-Value: 1.1015 W/(m² • °K)

Frame construction, no cavity insulation, R-2 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-2 board insulation, metal studs

U-Value: 1.3059 W/(m² • °K)

Frame construction, no cavity insulation, R-2 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-3 board insulation, wood studs

U-Value: 0.9198 W/(m² • °K)

Frame construction, no cavity insulation, R-3 board insulation, wood studs [Source: CIBSE]

Material	Description	R-	Thickness	Conductivity	Density	Specific

		Value				Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-3 board insulation, metal studs

U-Value: 1.0618 W/(m² • °K)

Frame construction, no cavity insulation, R-3 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-4 board insulation, wood studs

U-Value: 0.7892 W/(m² • °K)

Frame construction, no cavity insulation, R-4 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-4 board insulation, metal studs

U-Value: 0.8914 W/(m² • °K)

Frame construction, no cavity insulation, R-4 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-

6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-5 board insulation, wood studs

U-Value: 0.6927 W/(m² • °K)

Frame construction, no cavity insulation, R-5 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-5 board insulation, wood studs

U-Value: 0.7722 W/(m² • °K)

Frame construction, no cavity insulation, R-5 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-6 board insulation, wood studs

U-Value: 0.6189 W/(m² • °K)

Frame construction, no cavity insulation, R-6 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-6 board insulation, metal studs

U-Value: 0.6813 W/(m² • °K)

Frame construction, no cavity insulation, R-6 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 insulation, wood studs

U-Value: 0.5507 W/(m² • °K)

Frame construction, R-11 cavity insulation, no board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 insulation, metal studs

U-Value: 0.6927 W/(m² • °K)

Frame construction, R-11 cavity insulation, no board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-2 insulation, wood studs

U-Value: 0.4883 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-2 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² •	-	-	-	-

		°K)/W				
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-2 insulation, metal studs

U-Value: 0.6018 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-2 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 and R-3 insulation, wood studs

U-Value: 0.4485 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-3 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-3 insulation, metal studs

U-Value: 0.5450 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-3 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-4 insulation, wood studs

U-Value: 0.4144 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-4 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-4 insulation, metal studs

U-Value: 0.4996 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-4 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-5 insulation, wood studs

U-Value: 0.3861 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-5 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-5 insulation, metal studs

U-Value: 0.4599 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-5 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-

R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-6 insulation, wood studs

U-Value: 0.3633 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-6 board insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-11 plus R-6 insulation, metal studs

U-Value: 0.4258 W/(m² • °K)

Frame construction, R-11 cavity insulation, R-6 board insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 insulation, wood sheathing, wood studs

U-Value: 0.4883 W/(m² • °K)

Frame construction, R-15 cavity insulation, no board insulation, wood sheathing, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 insulation, wood sheathing, metal studs

U-Value: 0.6189 W/(m² • °K)

Frame construction, R-15 cavity insulation, no board insulation, wood sheathing, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-2 insulation, wood studs

U-Value: 0.4372 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-2 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-2 insulation, metal studs

U-Value: 0.5507 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-2 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-3 insulation, wood studs

U-Value: 0.4031 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-3 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-

R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-3 insulation, metal studs

U-Value: 0.4996 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-3 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-4 insulation, wood studs

U-Value: 0.3747 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-4 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-4 insulation, metal studs

U-Value: 0.4599 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-4 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-5 insulation, wood studs

U-Value: 0.3520 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-5 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-5 insulation, metal studs

U-Value: 0.4258 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-5 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-6 insulation, wood studs

U-Value: 0.3293 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-6 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-15 plus R-6 insulation, metal studs

U-Value: 0.3974 W/(m² • °K)

Frame construction, R-15 cavity insulation, R-6 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-

R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 insulation, wood sheathing, wood studs

U-Value: 0.36907 W/(m² • °K)

Frame construction, R-21 cavity insulation, no board insulation, wood sheathing, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 insulation, wood sheathing, metal studs

U-Value: 0.5621 W/(m² • °K)

Frame construction, R-21 cavity insulation, no board insulation, wood sheathing, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
No insulation	No insulation	1 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-2 insulation, wood studs

U-Value: 0.3406 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-2 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-2 insulation, metal studs

U-Value: 0.5053 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-2 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-3 insulation, wood studs

U-Value: 0.3350 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-3 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-3 insulation, metal studs

U-Value: 0.4655 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-3 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-4 insulation, wood studs

U-Value: 0.3007 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-4 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-4 insulation, metal studs

U-Value: 0.4258 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-4 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-5 insulation, wood studs

U-Value: 0.2839 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-5 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-5 insulation, metal studs

U-Value: 0.3974 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-5 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-6 insulation, wood studs

U-Value: 0.2725 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-6 insulation, wood studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
6 in timber studding	6 in (150 mm) timber studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Frame construction, R-21 plus R-6 insulation, metal studs

U-Value: 0.3747 W/(m² • °K)

Frame construction, R-21 cavity insulation, R-6 insulation, metal studs [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Polystyrene 3 1/2 in w/ 48 in oc SIP wall frame	Polystyrene 3 1/2 in (90 mm) including SIP wall frame factor	12.5 (m² • °K)/W	-	-	-	-
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
6 in metal studding	6 in (150 mm) metal studding	-	0.140 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Siding, R-2 insulation, interior finish

U-Value: 1.1412 W/(m² • °K)

Block, stucco or siding, R-2 board insulation, open core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-2 insulation, filled core, interior finish

U-Value: 0.8687 W/(m² • °K)

Block, stucco or siding, R-2 board insulation, filled core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-

Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-3 insulation, interior finish

U-Value: 0.9482 W/(m² • °K)

Block, stucco or siding, R-3 board insulation, open core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-3 insulation, filled core, interior finish

U-Value: 0.7464 W/(m² • °K)

Block, stucco or siding, R-3 board insulation, filled core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-4 insulation, interior finish

U-Value: 0.8119 W/(m² • °K)

Block, stucco or siding, R-4 board insulation, open core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-4 insulation, filled core, interior finish

U-Value: 0.6643 W/(m² • °K)

Block, stucco or siding, R-4 board insulation, filled core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg •

						°K)
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-5 insulation, interior finish

U-Value: 0.7097 W/(m² • °K)

Block, stucco or siding, R-5 board insulation, open core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-5 insulation, filled core, interior finish

U-Value: 0.5961 W/(m² • °K)

Block, stucco or siding, R-5 board insulation, filled core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-6 insulation, interior finish

U-Value: 0.6302 W/(m² • °K)

Block, stucco or siding, R-6 board insulation, open core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-6 insulation, filled core, plus interior finish

U-Value: 0.5394 W/(m² • °K)

Block, stucco or siding, R-6 board insulation, filled core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-6 insulation	R-6 insulation	6 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-10 insulation, interior finish

U-Value: 0.4372 W/(m² • °K)

Block, stucco or siding, R-10 board insulation, open core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-10 insulation	R-10 insulation	10 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-10 insulation, filled core, interior finish

U-Value: 0.3917 W/(m² • °K)

Block, stucco or siding, R-10 board insulation, filled core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-10 insulation	R-10 insulation	10 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-15 insulation, interior finish

U-Value: 0.3179 W/(m² • °K)

Block, stucco or siding, R-15 board insulation, open core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Siding, R-15 insulation, filled core, interior finish

U-Value: 0.2895 W/(m² • °K)

Block, stucco or siding, R-15 board insulation, filled core, plus interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-11 plus R-2 insulation

U-Value: 0.5507 W/(m² • °K)

Block, any exterior finish, R-11 stud cavity, R-2 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-11 plus R-2 insulation, filled

U-Value: 0.4769 W/(m² • °K)

Block, any exterior finish, R-11 stud cavity, R-2 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-11 plus R-3 insulation

U-Value: 0.5053 W/(m² • °K)

Block, any exterior finish, R-11 stud cavity, R-3 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg •

						°K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-11 plus R-3 insulation, filled

U-Value: 0.4428 W/(m² • °K)

Block, any exterior finish, R-11 stud cavity, R-3 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-11 plus R-4 insulation

U-Value: 0.4655 W/(m² • °K)

Block, any exterior finish, R-11 stud cavity, R-4 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-11 plus R-4 insulation, filled

U-Value: 0.4088 W/(m² • °K)

Block, any exterior finish, R-11 stud cavity, R-4 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² •	-	-	-	-

		°K)/W				
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-11 plus R-5 insulation

U-Value: 0.4258 W/(m² • °K)

Block, any exterior finish, R-11 stud cavity, R-5 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-11 plus R-5 insulation, filled

U-Value: 0.3804 W/(m² • °K)

Block, any exterior finish, R-11 stud cavity, R-5 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-11 insulation	R-11 insulation	11 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-15 plus R-2 insulation

U-Value: 0.5053 W/(m² • °K)

Block, any exterior finish, R-15 stud cavity, R-2 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-15 plus R-2 insulation, filled

U-Value: 0.4428 W/(m² • °K)

Block, any exterior finish, R-15 stud cavity, R-2 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-15 plus R-3 insulation

U-Value: 0.4655 W/(m² • °K)

Block, any exterior finish, R-15 stud cavity, R-3 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-15 plus R-3 insulation, filled

U-Value: 0.4144 W/(m² • °K)

Block, any exterior finish, R-15 stud cavity, R-3 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-15 plus R-4 insulation

U-Value: 0.4315 W/(m² • °K)

Block, any exterior finish, R-15 stud cavity, R-4 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-15 plus R-4 insulation, filled

U-Value: 0.3861 W/(m² • °K)

Block, any exterior finish, R-15 stud cavity, R-4 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-15 plus R-5 insulation

U-Value: 0.3974 W/(m² • °K)

Block, any exterior finish, R-15 stud cavity, R-5 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-15 plus R-5 insulation, filled

U-Value: 0.3577 W/(m² • °K)

Block, any exterior finish, R-15 stud cavity, R-5 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)

1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-15 insulation	R-15 insulation	15 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-21 plus R-2 insulation

U-Value: 0.4712 W/(m² • °K)

Block, any exterior finish, R-21 stud cavity, R-2 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-21 plus R-2 insulation, filled

U-Value: 0.4144 W/(m² • °K)

Block, any exterior finish, R-21 stud cavity, R-2 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-2 insulation	R-2 insulation	2 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-21 plus R-3 insulation

U-Value: 0.4315 W/(m² • °K)

Block, any exterior finish, R-21 stud cavity, R-3 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-

R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-21 plus R-3 insulation, filled

U-Value: 0.3861 W/(m² • °K)

Block, any exterior finish, R-21 stud cavity, R-3 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-3 insulation	R-3 insulation	3 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-21 plus R-4 insulation

U-Value: 0.4031 W/(m² • °K)

Block, any exterior finish, R-21 stud cavity, R-4 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-21 plus R-4 insulation, filled

U-Value: 0.3633 W/(m² • °K)

Block, any exterior finish, R-21 stud cavity, R-4 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-4 insulation	R-4 insulation	4 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-21 plus R-5 insulation

U-Value: 0.3747 W/(m² • °K)

Block, any exterior finish, R-21 stud cavity, R-5 board, open core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Block, interior/exterior finish, R-21 plus R-5 insulation, filled

U-Value: 0.3406 W/(m² • °K)

Block, any exterior finish, R-21 stud cavity, R-5 board, filled core, interior finish [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Concrete block (dense)	Concrete block (dense)	-	0.200 m	1.63 W/(m • °K)	2300 kg/m³	1000 J/(kg • °K)
1 in stucco	1 in (25 mm) stucco	-	0.0254 m	0.72 W/(m • °K)	1856 kg/m³	840 J/(kg • °K)
R-21 insulation	R-21 insulation	21 (m² • °K)/W	-	-	-	-
R-5 insulation	R-5 insulation	5 (m² • °K)/W	-	-	-	-
Finish (HF-A6)	Finish (HF-A6)	0.17 (m² • °K)/W	0.012710 m	0.415376 W/(m • °K)	1249.560000 kg/m³	1088.568000 J/(kg • °K)

Light-weight plaster, brick, light-weight plaster

U-Value: 1.75 W/(m² • °K)

1/2 in (12 mm) lightweight plaster 4 in (100 mm) brick, 1/2 in (12 mm) lightweight plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
4 in brick	4 in (100 mm) brick	-	0.105 m	0.72 W/(m • °K)	1920 kg/m³	840 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Light-weight plaster, concrete block, light-weight plaster

U-Value: 1.05 W/(m² • °K)

1/2 in (12 mm) lightweight plaster, 4 in (100 mm) lightweight concrete block, 1/2 in (12 mm) lightweight plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg •

						°K)
Lightweight aggregate concrete block	Lightweight aggregate concrete block	-	0.100 m	0.19 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)
Plaster (lightweight)	Plaster (lightweight)	-	0.013 m	0.16 W/(m • °K)	600 kg/m³	1000 J/(kg • °K)

Plasterboard, timber studding, plasterboard

U-Value: 1.75 W/(m² • °K)

1/2 in (12 mm) plasterboard, timber studding, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)
Timber studding	Timber studding	-	0.095 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

MEP Constructions for Buildings and Spaces

Doors

Wooden

U-Value: 2.1944 W/(m² • °K)

Wooden door

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Metal

U-Value: 3.7021 W/(m² • °K)

Metal door

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Timber flush-panel hollow-core

U-Value: 2.3256 W/(m² • °K)

Timber flush-Panel hollow-core door (normally hung)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Solid hardwood

U-Value: 2.5572 W/(m² • °K)

Solid Hardwood door (normally hung)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Hollow core wood

U-Value: 3.1796 W/(m² • °K)

Hollow core wood [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)

Door - wood - hollow core - wood storm

U-Value: 1.8737 W/(m² • °K)

Door - wood - hollow core - wood storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)

Hollow core wood, metal storm

U-Value: 2.0441 W/(m² • °K)

Hollow core wood, metal storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)

Solid core wood

U-Value: 2.6119 W/(m² • °K)

Solid core wood [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Solid core wood, wood storm

U-Value: 1.6466 W/(m² • °K)

Solid core wood, wood storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Solid core wood, metal storm

U-Value: 1.8170 W/(m² • °K)

Solid core wood, metal storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Wood panel

U-Value: 3.8042 W/(m² • °K)

Wood panel [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Wood panel with wood storm

U-Value: 2.0440 W/(m² • °K)

Wood panel with wood storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Wood panel, metal storm

U-Value: 2.3279 W/(m² • °K)

Wood panel, metal storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 1/2 in wood	1 1/2 in (40 mm) wood	-	0.0376 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Metal, fiberglass core

U-Value: 3.3500 W/(m² • °K)

Metal, fiberglass core [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Metal, fiberglass core, storm

U-Value: 2.0838 W/(m² • °K)

Metal with fiberglass core and storm door [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard	1/2 in (12 mm) fiberboard	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300

sheathing	sheathing					J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Wood frame with single clear glass

U-Value: 5.6212 W/(m² • °K)

Wood frame with single clear glass [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

Metal frame with single clear glass

U-Value: 6.5580 W/(m² • °K)

Metal frame with single clear glass [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

Wood frame, single glass door, glass storm

U-Value: 2.6970 W/(m² • °K)

Wood frame, single glass door, glass storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

Metal frame, single glass door, glass storm

U-Value: 3.6907 W/(m² • °K)

Metal frame, single glass door, glass storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

Wood frame, double glass door

U-Value: 3.1286 W/(m² • °K)

Wood frame, double glass door [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Opaque spandral	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528	880 J/(kg

glass					kg/m³	• °K)

Metal frame, double glass door

U-Value: 4.1165 W/(m² • °K)

Metal frame, double glass door [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

Wood frame, double/triple glass, glass storm

U-Value: 1.9361 W/(m² • °K)

Wood frame, double/triple glass, glass storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

Metal frame, double/triple glass, glass storm

U-Value: 2.7822 W/(m² • °K)

Metal frame, double/triple glass, glass storm [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

French door, wood frame with single glass

U-Value: 5.3089 W/(m² • °K)

French door, wood frame with single clear glass [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

French door, metal frame with single glass

U-Value: 6.8703 W/(m² • °K)

French door, metal frame with single clear glass [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

French door, wood frame with double glass

U-Value: 2.9639 W/(m² • °K)

French door, wood frame with double glass [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

French door, metal frame with double glass

U-Value: 4.2812 W/(m² • °K)

French door, metal frame with double glass [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

French door, wood frame with triple glass

U-Value: 2.1065 W/(m² • °K)

French door, wood frame with triple glass [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
5/8 in plywood	5/8 in (16 mm) plywood	-	0.0159 m	0.12 W/(m • °K)	544 kg/m³	1210 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

French door, metal frame with triple glass

U-Value: 3.3216 W/(m² • °K)

French door, metal frame with triple glass [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Opaque spandral glass	Opaque spandral glass	-	0.0064 m	0.99 W/(m • °K)	2528 kg/m³	880 J/(kg • °K)

MEP Constructions for Buildings and Spaces

Roofs

Flat roof - A

U-Value: 0.2497 W/(m² • °K)

Flat roof

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Flat roof - B

U-Value: 0.2277 W/(m² • °K)

Flat roof

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
Acoustic tile	Acoustic tile	-	0.0191 m	0.06 W/(m • °K)	368 kg/m³	590 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Flat roof - C

U-Value: 0.3183 W/(m² • °K)

Flat roof

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg •

						°K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Sloping roof including loft

U-Value: 0.1589 W/(m² • °K)

Sloping roof including loft

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Acoustic tile	Acoustic tile	-	0.0191 m	0.06 W/(m • °K)	368 kg/m³	590 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Sloping roof including loft

U-Value: 0.2330 W/(m² • °K)

Sloping roof including loft

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Wood shingles	Wood shingles	-	0.0064 m	0.04 W/(m • °K)	592 kg/m³	1300 J/(kg • °K)
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Lightweight curtain roof

U-Value: 0.2487 W/(m² • °K)

Lightweight curtain roof

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Lightweight curtain roof

U-Value: 0.2392 W/(m² • °K)

Lightweight curtain roof

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Slate or tile	Slate or tile	-	0.0127 m	1.59 W/(m • °K)	1920 kg/m³	1260 J/(kg • °K)
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Sloping roof - domestic

U-Value: 3.3775 W/(m² • °K)

Sloping roof - domestic

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Un-insulated flat roof

U-Value: 1.5583 W/(m² • °K)

Un-insulated flat roof

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Wood shingle (WS01)	For walls	0.87 (m² • °K)/W	0.017769 m	0.115440 W/(m • °K)	512.640000 kg/m³	1256.040000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R13 w/ 2x4 frame	Batt, R-13 including framing factor	9.23 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Super-insulated flat roof

U-Value: 0.1769 W/(m² • °K)

Super-insulated flat roof

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Roof terrace system

U-Value: 0.4694 W/(m² • °K)

Roof terrace system

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

Roof terrace system

U-Value: 1.3824 W/(m² • °K)

Roof terrace system

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-

Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.75 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Steel sheet with 2 in insulation

U-Value: 0.5343 W/(m² • °K)

Steel sheet with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.75 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Steel sheet with 1 in insulation

U-Value: 0.5343 W/(m² • °K)

Steel sheet with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.75 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Steel sheet with 2 in insulation

U-Value: 0.7254 W/(m² • °K)

Steel sheet with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.75 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Steel sheet with 1 in insulation

U-Value: 1.2694 W/(m² • °K)

Steel sheet with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.75 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Steel sheet with 4 in insulation

U-Value: 0.3275 W/(m² • °K)

Steel sheet with 4 in (100 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
Acoustic tile	Acoustic tile	-	0.0191 m	0.06 W/(m • °K)	368 kg/m³	590 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Steel sheet with 8 in insulation

U-Value: 0.1846 W/(m² • °K)

Steel sheet with 8 in (200 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R30 (IN05)	Batt, R-30 24.58 cm	32.26 (m² • °K)/W	0.245809 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Steel sheet with 12 in insulation

U-Value: 0.1286 W/(m² • °K)

Steel sheet with 12 in (300 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Stone chipping, asphalt, screed, heavy concrete block

U-Value: 2.5405 W/(m² • °K)

1 in (25 mm) stone chipping 3/4 in (19 mm) asphalt 1 1/2 in (40 mm) screed 6 in (150 mm) concrete block (heavy)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in stone	1 in (25 mm) stone	-	0.0254 m	3.17 W/(m • °K)	2560 kg/m³	790 J/(kg • °K)
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg • °K)

Stone chipping, asphalt, screed, light concrete block

U-Value: 0.9165 W/(m² • °K)

1 in (25 mm) stone chipping 3/4 in (19 mm) asphalt 1 1/2 in (40 mm) screed 6 in (150 mm) concrete block (light)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in stone	1 in (25 mm) stone	-	0.0254 m	3.17 W/(m • °K)	2560 kg/m³	790 J/(kg • °K)
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg • °K)

Asphalt, screed, dense cast concrete, dense plaster

U-Value: 2.0240 W/(m² • °K)

3/4 in (19 mm) asphalt 3 in (75 mm) screed 6 in (150 mm) cast concrete (dense) 1/2 in (12 mm) plaster (dense)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Asphalt, aerated concrete slab, dense plaster

U-Value: 0.8760 W/(m² • °K)

3/4 in (19 mm) asphalt 6 in (150 mm) Aerated concrete slab 1/2 in (12 mm) plaster (dense)

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
Autoclaved Aerated concrete block (density 500)	Autoclaved Aerated concrete block (density 500)	-	0.150 m	0.18 W/(m • °K)	500 kg/m³	1050 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Asphalt, fiberboard, aced, air, aced

U-Value: 1.5867 W/(m² • °K)

3/4 in (19 mm) asphalt 1/2 in (12 mm) fiberboard 3/8 in (10 mm) aced 1 in (25 mm) air 3/8 in (10 mm) aced

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Slate or tile	Slate or tile	-	0.0127 m	1.59 W/(m • °K)	1920 kg/m³	1260 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Slate or tile	Slate or tile	-	0.0127 m	1.59 W/(m • °K)	1920 kg/m³	1260 J/(kg • °K)

Asphalt, fiberboard, gypsum

U-Value: 1.3207 W/(m² • °K)

3/4 in (19 mm) asphalt 1/2 in (12 mm) fiberboard 1 in (25 mm) air 3/8 in (10 mm) gyp.

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Asphalt, fiberboard, 1 in batting, gypsum

U-Value: 0.7923 W/(m² • °K)

3/4 in (19 mm) asphalt 1/2 in (12 mm) fiberboard 1 in (25 mm) air 1 in (25 mm) batt 3/8 in (10 mm) gyp.

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
R-30, 9 1/2 in batt insulation	R-30, 9 1/2 in (240 mm) batt insulation	-	0.2438 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Asphalt, fiberboard, 2 in batting, gypsum

U-Value: 0.5299 W/(m² • °K)

3/4 in (19 mm) asphalt 1/2 in (12 mm) fiberboard 1 in (25 mm) air 2 in (50 mm) batt 3/8 in (10 mm) gyp.

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
Minwool batt R7 (IN01)	Batt, R-7 5.74 cm	7.53 (m² • °K)/W	0.057361 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

3/4 in asphalt 1/2 in fiberboard 1 in air 3 in batt 3/8 in gyp.

U-Value: 0.3981 W/(m² • °K)

3/4 in (19 mm) asphalt 1/2 in (12 mm) fiberboard 1 in (25 mm) air 3 in (75 mm) batt 3/8 in (10 mm) gyp.

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
R-11, 3 1/2 in batt insulation	R-11, 3 1/2 in (87 mm) batt insulation	-	0.0894 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

3/4 in asphalt 1/2 in fiberboard 2 in EPS slab 1 in air 3/8 in gyp.

U-Value: 0.7399 W/(m² • °K)

3/4 in (19 mm) asphalt 1/2 in (12 mm) fiberboard 2 in (50 mm) EPS slab 1 in (25 mm) air 3/8 in (10 mm) gyp.

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
2 in Expanded polystyrene (EPS)	2 in (50 mm) Expanded polystyrene (EPS)	-	0.050 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

3/4 in asphalt 1/2 in fiberboard 2 in EPS slab 1 in air 3/8 in gyp.

U-Value: 0.4841 W/(m² • °K)

3/4 in (19 mm) asphalt 1/2 in (12 mm) fiberboard 2 in (50 mm) EPS slab 1 in (25 mm) air 3/8 in (10 mm) gyp.

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
2 in Expanded polystyrene (EPS)	2 in (50 mm) Expanded polystyrene (EPS)	-	0.050 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

3/4 in asphalt 1/2 in screed 2 in wood wool slab 1 in air 3/8 in gyp.

U-Value: 1.0502 W/(m² • °K)

3/4 in (19 mm) asphalt 1/2 in (12 mm) screed 2 in (50 mm) wood wool slab 1 in (25 mm) air 3/8 in (10 mm) gyp.

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

3/4 in felt / bitumen 1 in EPS slab 1/8 in metal deck

U-Value: 1.1206 W/(m² • °K)

3/4 in (19 mm) felt / bitumen 1 in (25 mm) EPS slab 1/8 in (3 mm) metal deck

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Poured asphalt	Poured asphalt	-	0.019 m	1.20 W/(m • °K)	2100 kg/m³	920 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Air space	Air space proxy for air wall or no construction	0.62 (m² • °K)/W	-	-	-	-

GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

4 in wood with 2 in insulation

U-Value: 0.3688 W/(m² • °K)

4 in (100 mm) wood with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

2 1/2 in wood with 2 in insulation

U-Value: 0.6746 W/(m² • °K)

2 1/2 in wood with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

4 in wood with 2 in insulation

U-Value: 0.8566 W/(m² • °K)

4 in (100 mm) wood with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

4 in wood with 1 in insulation

U-Value: 0.4716 W/(m² • °K)

4 in (100 mm) wood with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

2 1/2 in wood with 1 in insulation

U-Value: 0.5538 W/(m² • °K)

2 1/2 in (65 mm) wood with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

1 in wood with 1 in insulation

U-Value: 0.6708 W/(m² • °K)

1 in (25 mm) wood with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

8 in lightweight concrete

U-Value: 0.5363 W/(m² • °K)

8 in (200 mm) lightweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

6 in lightweight concrete

U-Value: 0.6365 W/(m² • °K)

6 in (150 mm) lightweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in lightweight concrete	6 in (150 mm) lightweight concrete	-	0.1524 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in lightweight concrete

U-Value: 0.7828 W/(m² • °K)

4 in (100 mm) lightweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

6 in heavyweight concrete with 2 in insulation

U-Value: 0.5103 W/(m² • °K)

6 in (150 mm) heavyweight concrete with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete with 2 in insulation

U-Value: 0.5181 W/(m² • °K)

4 in (100 mm) heavyweight concrete with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

2 in heavyweight concrete with 2 in insulation

U-Value: 0.5261 W/(m² • °K)

2 in (50 mm) heavyweight concrete with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

6 in heavyweight concrete with 1 in insulation

U-Value: 0.7305 W/(m² • °K)

6 in (150 mm) heavyweight concrete with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete with 1 in insulation

U-Value: 0.7465 W/(m² • °K)

4 in (100 mm) heavyweight concrete with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

2 in heavyweight concrete with 1 in

U-Value: 0.7632 W/(m² • °K)

insulation

2 in (50 mm) heavyweight concrete with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in wood with 2 in insulation

U-Value: 0.4508 W/(m² • °K)

4 in (100 mm) wood with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

2 1/2 in wood with 2 in insulation

U-Value: 0.5254 W/(m² • °K)

2 1/2 in (65 mm) wood with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

1 in wood with 2 in insulation

U-Value: 0.6296 W/(m² • °K)

1 in (25 mm) wood with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

4 in wood with 1 in insulation

U-Value: 0.6145 W/(m² • °K)

4 in (100 mm) wood with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-5, 1 in insulation	R-5, 1 in (25 mm) insulation	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg •

board	board					°K)
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

2 1/2 in wood with 1 in insulation

U-Value: 0.7619 W/(m² • °K)

2 1/2 in (65 mm) wood with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

1 in wood with 1 in insulation

U-Value: 1.0023 W/(m² • °K)

1 in (25 mm) wood with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

8 in lightweight concrete

U-Value: 0.7291 W/(m² • °K)

8 in (200 mm) lightweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

6 in lightweight concrete

U-Value: 0.9277 W/(m² • °K)

6 in (150 mm) lightweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in lightweight concrete	6 in (150 mm) lightweight concrete	-	0.1524 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)

4 in lightweight concrete

U-Value: 1.2750 W/(m² • °K)

4 in (100 mm) lightweight concrete

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in brick	4 in (100 mm) brick	-	0.1016 m	0.89 W/(m • °K)	1920 kg/m³	790 J/(kg • °K)

6 in heavyweight concrete with 2 in insulation

U-Value: 0.6819 W/(m² • °K)

6 in (150 mm) heavyweight concrete with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete with 2 in insulation

U-Value: 0.6958 W/(m² • °K)

4 in (100 mm) heavyweight concrete with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

2 in heavyweight concrete with 2 in insulation

U-Value: 0.7103 W/(m² • °K)

2 in (50 mm) heavyweight concrete with 2 in (50 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

6 in heavyweight concrete with 1 in insulation

U-Value: 1.1418 W/(m² • °K)

6 in (150 mm) heavyweight concrete with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete with 1 in insulation

U-Value: 1.1814 W/(m² • °K)

4 in (100 mm) heavyweight concrete with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

2 in heavyweight concrete with 1 in insulation

U-Value: 1.2238 W/(m² • °K)

2 in (50 mm) heavyweight concrete with 1 in (25 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-5, 1 in insulation board	R-5, 1 in (25 mm) insulation board	-	0.0254 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

2 in heavyweight concrete with 4 in insulation

U-Value: 0.3244 W/(m² • °K)

2 in (50 mm) heavyweight concrete with 4 in (100 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in heavyweight concrete with 4 in insulation

U-Value: 0.3214 W/(m² • °K)

4 in (100 mm) heavyweight concrete with 4 in (100 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

6 in heavyweight concrete with 4 in insulation

U-Value: 0.3184 W/(m² • °K)

6 in (150 mm) heavyweight concrete with 4 in (100 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

6 in heavyweight concrete with 6 in insulation

U-Value: 0.2314 W/(m² • °K)

6 in (150 mm) heavyweight concrete with 6 in (150 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

6 in heavyweight concrete with 9 in insulation

U-Value: 0.1641 W/(m² • °K)

6 in (150 mm) heavyweight concrete with 9 in (225 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

6 in heavyweight concrete with 12 in insulation

U-Value: 0.1271 W/(m² • °K)

6 in (150 mm) heavyweight concrete with 12 in (300 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)

R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)

4 in wood with 4 in insulation

U-Value: 0.2569 W/(m² • °K)

4 in (100 mm) wood with 4 in (100 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

4 in wood with 8 in insulation

U-Value: 0.1599 W/(m² • °K)

4 in (100 mm) wood with 8 in (200 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

4 in wood with 12 in insulation

U-Value: 0.1160 W/(m² • °K)

4 in (100 mm) wood with 12 in (300 mm) insulation

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in wood	4 in (100 mm) wood	-	0.1016 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)

Concrete ballast, membrane, sheathing, insulation, metal deck

U-Value: 0.297 W/(m² • °K)

2 in (50 mm) concrete roof ballast, membrane, sheathing, R-15 insulation board, metal deck [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
2 in lightweight concrete roof ballast	2 in (50 mm) lightweight concrete roof ballast	-	0.0508 m	0.19 W/(m • °K)	640 kg/m³	840 J/(kg • °K)
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Asphalt shingles, wood sheathing, R-19 batt insulation, gyp board

U-Value: 0.235 W/(m² • °K)

Asphalt shingles, wood sheathing, R-19 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Asphalt shingles	Asphalt shingles	-	0.0032 m	0.04 W/(m • °K)	1120 kg/m³	1260 J/(kg • °K)
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Slate or tile, wood sheathing, R-19 batt insulation, gyp board

U-Value: 0.239 W/(m² • °K)

Slate or tile, wood sheathing, R-19 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Slate or tile	Slate or tile	-	0.0127 m	1.59 W/(m • °K)	1920 kg/m³	1260 J/(kg • °K)
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg •

						°K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Wood shingles, wood sheathing, R-19 batt insulation, gyp board

U-Value: 0.231 W/(m² • °K)

Wood shingles, wood sheathing, R-19 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Wood shingles	Wood shingles	-	0.0064 m	0.04 W/(m • °K)	592 kg/m³	1300 J/(kg • °K)
1 in wood	1 in (25 mm) wood	-	0.0254 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Metal roof, R-19 batt insulation, gyp board

U-Value: 0.249 W/(m² • °K)

Metal roof, R-19 batt insulation, gyp board [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
5/8 in gyp board	5/8 in (16 mm) gyp board	-	0.0159 m	0.16 W/(m • °K)	800 kg/m³	1090 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Metal roof, R-19 batt insulation, suspended acoustical ceiling

U-Value: 0.227 W/(m² • °K)

Metal roof, R-19 batt insulation, suspended acoustical ceiling [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
Acoustic tile	Acoustic tile	-	0.0191 m	0.06 W/(m • °K)	368 kg/m³	590 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Metal roof, R-19 batt insulation

U-Value: 0.255 W/(m² • °K)

Metal roof, R-19 batt insulation [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt insulation	R-19, 6 1/4 in (155 mm) batt insulation	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-10 insulation board, wood deck

U-Value: 0.393 W/(m² • °K)

Membrane, sheathing, R-10 insulation board, wood deck [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-10, 2 in insulation	R-10, 2 in (50 mm)	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg •

board	insulation board					°K)
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-10 insulation, wood deck, suspended ceiling

U-Value: 0.329 W/(m² • °K)

Membrane, sheathing, R-10 insulation board, wood deck, suspended acoustical ceiling [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
2 in wood	2 in (50 mm) wood	-	0.0508 m	0.15 W/(m • °K)	608 kg/m³	1630 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
Acoustic tile	Acoustic tile	-	0.0191 m	0.06 W/(m • °K)	368 kg/m³	590 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-10 insulation board, metal deck

U-Value: 0.452 W/(m² • °K)

Membrane, sheathing, R-10 insulation board, metal deck [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-10 insulation, metal deck, suspended ceiling

U-Value: 0.370 W/(m² • °K)

Membrane, sheathing, R-10 insulation board, metal deck, suspended acoustical ceiling [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface	Outside surface resistance	0.04 (m²	-	-	-	-

resistance		• °K)/W				
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
Acoustic tile	Acoustic tile	-	0.0191 m	0.06 W/(m • °K)	368 kg/m³	590 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-15 insulation board, metal deck

U-Value: 0.323 W/(m² • °K)

Membrane, sheathing, R-15 insulation board, metal deck [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-10 plus R-15 insulation boards, metal deck

U-Value: 0.206 W/(m² • °K)

Membrane, sheathing, R-10 plus R-15 insulation boards, metal deck [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-10, 2 in insulation board	R-10, 2 in (50 mm) insulation board	-	0.0508 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
Metal surface	Metal surface	-	0.0008 m	45.28 W/(m • °K)	7824 kg/m³	500 J/(kg • °K)

Membrane, sheathing, R-15 insulation, 4 in light concrete

U-Value: 0.304 W/(m² • °K)

Membrane, sheathing, R-15 insulation board, 4 in (100 mm) lightweight concrete [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
4 in lightweight concrete	4 in (100 mm) lightweight concrete	-	0.1016 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-15 insulation, 6 in light concrete

U-Value: 0.296 W/(m² • °K)

Membrane, sheathing, R-15 insulation board, 6 in (150 mm) lightweight concrete [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in lightweight concrete	6 in (150 mm) lightweight concrete	-	0.1524 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-15 insulation, 8 in light concrete

U-Value: 0.288 W/(m² • °K)

Membrane, sheathing, R-15 insulation board, 8 in (200 mm) lightweight concrete [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in lightweight concrete	8 in (200 mm) lightweight concrete	-	0.2032 m	0.53 W/(m • °K)	1280 kg/m³	840 J/(kg • °K)
Inside horizontal	Inside horizontal surface	0.16 (m²	-	-	-	-

surface resistance	resistance	• °K)/W				

Membrane, sheathing, R-15 insulation, 6 in heavy concrete

U-Value: 0.315 W/(m² • °K)

Membrane, sheathing, R-15 insulation board, 6 in (150 mm) heavyweight concrete [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, sheathing, R-15 insulation, 8 in heavy concrete

U-Value: 0.313 W/(m² • °K)

Membrane, sheathing, R-15 insulation board, 8 in (200 mm) heavyweight concrete [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
1/2 in fiberboard sheathing	1/2 in (12 mm) fiberboard sheathing	-	0.0127 m	0.07 W/(m • °K)	400 kg/m³	1300 J/(kg • °K)
R-15, 3 in insulation board	R-15, 3 in (75 mm) insulation board	-	0.0762 m	0.03 W/(m • °K)	43 kg/m³	1210 J/(kg • °K)
8 in heavyweight concrete	8 in (200 mm) heavyweight concrete	-	0.2032 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

Membrane, concrete, R-19 insulation, suspended ceiling

U-Value: 0.239 W/(m² • °K)

Membrane, 6 in (150 mm) heavyweight concrete, R-19 batt insulation, suspended acoustical ceiling [Source: ASHRAE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Outside surface resistance	Outside surface resistance	0.04 (m² • °K)/W	-	-	-	-
Built-up roofing	Built-up roofing	-	0.0095 m	0.16 W/(m • °K)	1120 kg/m³	1460 J/(kg • °K)
6 in heavyweight concrete	6 in (150 mm) heavyweight concrete	-	0.1524 m	1.95 W/(m • °K)	2240 kg/m³	900 J/(kg • °K)
Ceiling air space resistance	Ceiling air space resistance	0.18 (m² • °K)/W	-	-	-	-
R-19, 6 1/4 in batt	R-19, 6 1/4 in (155 mm)	-	0.1544 m	0.05 W/(m • °K)	19 kg/m³	960 J/(kg •

insulation	batt insulation					°K)
Acoustic tile	Acoustic tile	-	0.0191 m	0.06 W/(m • °K)	368 kg/m³	590 J/(kg • °K)
Inside horizontal surface resistance	Inside horizontal surface resistance	0.16 (m² • °K)/W	-	-	-	-

R-10 over roof deck

U-Value: 0.483402 W/(m² • °K)

ASHRAE 90.1 compliant continuous R10 insulation over roof deck [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-15 over roof deck

U-Value: 0.373047 W/(m² • °K)

ASHRAE 90.1 compliant continuous R15 insulation over roof deck [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-19 wood framed roof

U-Value: 0.346474 W/(m² • °K)

ASHRAE 90.1 compliant R19 wood framed roof with attic [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 w/ 2x6 frame	Batt, R-19 including framing factor	14.68 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-20 over roof deck

U-Value: 0.256208 W/(m² • °K)

ASHRAE 90.1 compliant continuous R20 insulation over roof deck [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-25 over roof deck

U-Value: 0.221481 W/(m² • °K)

ASHRAE 90.1 compliant continuous R25 insulation over roof deck [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-30 wood frame roof

U-Value: 0.167165 W/(m² • °K)

ASHRAE 90.1 compliant R30 wood framed roof with attic [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R30 (IN05)	Batt, R-30 24.58 cm	32.26 (m² • °K)/W	0.245809 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-38 wood frame roof

U-Value: 0.133381 W/(m² • °K)

ASHRAE 90.1 compliant R38 wood framed roof with attic [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-49 wood frame roof

U-Value: 0.113531 W/(m² • °K)

ASHRAE 90.1 compliant R49 wood framed roof with attic [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R24 (IN04)	Batt, R-24 21.24 cm	27.88 (m² • °K)/W	0.212405 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-60 wood frame roof

U-Value: 0.085740 W/(m² • °K)

ASHRAE 90.1 compliant R60 wood framed roof with attic [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R30 (IN05)	Batt, R-30 24.58 cm	32.26 (m² • °K)/W	0.245809 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R30 (IN05)	Batt, R-30 24.58 cm	32.26 (m² • °K)/W	0.245809 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-30 over roof deck

U-Value: 0.174291 W/(m² • °K)

ASHRAE 90.1 compliant continuous R30 insulation over roof deck [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-15 over roof deck - cool roof

U-Value: 0.373047 W/(m² • °K)

ASHRAE 90.1 compliant continuous R15 insulation over roof deck with reflective coating [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-20 over roof deck - cool roof

U-Value: 0.256208 W/(m² • °K)

ASHRAE 90.1 compliant continuous R20 insulation over roof deck-Cool roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-18.7 over roof deck

U-Value: 0.303780 W/(m² • °K)

ASHRAE 90.1 compliant continuous R18.7 insulation over roof deck [Source: CIBSE]

Material	Description	R-	Thickness	Conductivity	Density	Specific

		Value				Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m^{2} • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m^{3}	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m^{2} • °K)/W	-	-	-	-
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m^{2} • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m^{3}	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m^{2} • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m^{3}	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m^{2} • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m^{3}	1381.644000 J/(kg • °K)

R-30 over roof deck - cool roof

U-Value: 0.174291 W/(m^{2} • °K)

ASHRAE 90.1 compliant continuous R30 insulation over roof deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m^{2} • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m^{3}	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m^{2} • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m^{2} • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m^{3}	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m^{2} • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m^{3}	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m^{2} • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m^{3}	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m^{2} • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m^{3}	1381.644000 J/(kg • °K)

R-18.7 over roof deck - cool roof

U-Value: 0.303780 W/(m^{2} • °K)

ASHRAE 90.1 compliant continuous R18.7 insulation over roof deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m^{2} • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m^{3}	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m^{2} • °K)/W	-	-	-	-
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m^{2} • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m^{3}	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m^{2} • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m^{3}	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m^{2} • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m^{3}	1381.644000 J/(kg • °K)

R-38 over roof deck

U-Value: 0.148155 W/(m^{2} • °K)

ASHRAE 90.1 compliant continuous R38 insulation over roof deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in	Blt-Up roof 3/8 in (1 cm)	0.33 (m^{2}	0.009540 m	0.162516 W/(m	1121.400000	1465.380000

(BR01)		• °K)/W		• °K)	kg/m³	J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 7/8 in R-3 (N21)	R-3.0 MinBd 7/8 in (2.2 cm)	3.04 (m² • °K)/W	0.022219 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 7/8 in R-3 (N21)	R-3.0 MinBd 7/8 in (2.2 cm)	3.04 (m² • °K)/W	0.022219 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-38 over roof deck-cool roof

U-Value: 0.148155 W/(m² • °K)

ASHRAE 90.1 compliant continuous R38 insulation over roof deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 3 in R-10.4 (IN24)	R-10.4 MinBd 3 in (7.6 cm)	10.42 (m² • °K)/W	0.076196 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 7/8 in R-3 (N21)	R-3.0 MinBd 7/8 in (2.2 cm)	3.04 (m² • °K)/W	0.022219 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 7/8 in R-3 (N21)	R-3.0 MinBd 7/8 in (2.2 cm)	3.04 (m² • °K)/W	0.022219 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-50 over roof deck

U-Value: 0.114398 W/(m² • °K)

ASHRAE 90.1 compliant continuous R50 insulation over roof deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R24	Batt, R-24 21.24 cm	27.88	0.212405 m	0.043268 W/(m	9.612000	837.360000

(IN04)		(m² • °K)/W		• °K)	kg/m³	J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-50 over roof deck-cool roof

U-Value: 0.114398 W/(m² • °K)

ASHRAE 90.1 compliant continuous R50 insulation over roof deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R24 (IN04)	Batt, R-24 21.24 cm	27.88 (m² • °K)/W	0.212405 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-13 wood frame roof

U-Value: 0.386977 W/(m² • °K)

ASHRAE 90.1 compliant R13 wood framed roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Cellulose 3 1/2 in R-13 (IN13)	Cellulose 3 1/2 in (8.9 cm)	12.96 (m² • °K)/W	0.088906 m	0.038942 W/(m • °K)	48.060000 kg/m³	1381.644000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-22 wood frame roof

U-Value: 0.233288 W/(m² • °K)

ASHRAE 90.1 compliant R22 wood framed roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 (IN02)	Batt, R-11 9.01 cm	11.83 (m² • °K)/W	0.090125 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool Fill 3 1/2 in R11 (IN11)	R11 Fill, 3 1/2 in (8.9 cm)	10.8 (m² • °K)/W	0.088906 m	0.046730 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m²	0.015879 m	0.160266 W/(m	801.000000	837.360000

		• °K)/W		• °K)	kg/m³	J/(kg • °K)

R-26 wood frame roof

U-Value: 0.197023 W/(m² • °K)

ASHRAE 90.1 compliant R26 wood framed roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Insul Bd 2 in (HF-B3)	Insul Bd 2 in (3.1 cm)	6.68 (m² • °K)/W	0.050899 m	0.043268 W/(m • °K)	32.040000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-43 wood frame roof

U-Value: 0.123992 W/(m² • °K)

ASHRAE 90.1 compliant R43 wood framed roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R30 (IN05)	Batt, R-30 24.58 cm	32.26 (m² • °K)/W	0.245809 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R11 (IN02)	Batt, R-11 9.01 cm	11.83 (m² • °K)/W	0.090125 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-52 wood frame roof

U-Value: 0.104382 W/(m² • °K)

ASHRAE 90.1 compliant R52 wood framed roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R30 (IN05)	Batt, R-30 24.58 cm	32.26 (m² • °K)/W	0.245809 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² •	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)

		°K)/W				
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-11 wood frame roof

U-Value: 0.453798 W/(m² • °K)

ASHRAE 90.1 compliant R13 wood framed roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool Fill 3 1/2 in R11 (IN11)	R11 Fill, 3 1/2 in (8.9 cm)	10.8 (m² • °K)/W	0.088906 m	0.046730 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-15 wood frame roof

U-Value: 0.363977 W/(m² • °K)

ASHRAE 90.1 compliant R15 wood framed roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
MinBd 2 in R-7 (IN23)	R-7.0 MinBd 2 in (50 mm)	6.95 (m² • °K)/W	0.050808 m	0.041538 W/(m • °K)	240.300000 kg/m³	711.756000 J/(kg • °K)
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-0 wood or steel frame roof

U-Value: 4.835096 W/(m² • °K)

R0 wood or steel framed roof [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)

R-0 over roof deck

U-Value: 4.268411 W/(m² • °K)

R0 insulation over roof deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat

Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-60 over roof deck

U-Value: 0.092384 W/(m² • °K)

R60 insulation over roof deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Minwool batt R24 (IN04)	Batt, R-24 21.24 cm	27.88 (m² • °K)/W	0.212405 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R30 (IN05)	Batt, R-30 24.58 cm	32.26 (m² • °K)/W	0.245809 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)

R-19 insulation over concret deck

U-Value: 0.286936 W/(m² • °K)

R19 insulation over concrete deck [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Blt-Up roof 3/8 in (BR01)	Blt-Up roof 3/8 in (1 cm)	0.33 (m² • °K)/W	0.009540 m	0.162516 W/(m • °K)	1121.400000 kg/m³	1465.380000 J/(kg • °K)
Polyurethane 3 in (IN46)	Polyurethane 3 in (7.6 cm)	18.8 (m² • °K)/W	0.076196 m	0.023019 W/(m • °K)	24.030000 kg/m³	1590.984000 J/(kg • °K)
Conc heavyweight 140lb 6 in (CC04)	Conc heavyweight 140lb 6 in (15.2 cm)	0.66 (m² • °K)/W	0.152393 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)

R-38 attic ceiling

U-Value: 0.136704 W/(m² • °K)

R38 over gypboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-30 attic ceiling

U-Value: 0.172417 W/(m² • °K)

R30 over gypboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Minwool batt R11	Batt, R-11 9.01 cm	11.83	0.090125 m	0.043268 W/(m	9.612000	837.360000

(IN02)		(m² • °K)/W		• °K)	kg/m³	J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-45 attic ceiling

U-Value: 0.115730 W/(m² • °K)

R45 over gypboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Minwool batt R7 (IN01)	Batt, R-7 5.74 cm	7.53 (m² • °K)/W	0.057361 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
Minwool batt R19 (IN03)	Batt, R-19 15.57 cm	20.43 (m² • °K)/W	0.155684 m	0.043268 W/(m • °K)	9.612000 kg/m³	837.360000 J/(kg • °K)
GypBd 3/4 in (GP03)	GypBd 3/4 in (1.9 cm)	0.67 (m² • °K)/W	0.019049 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-11 wood frame roof

U-Value: 0.542903 W/(m² • °K)

2001 title 24 compliant R11 wood framed roof with attic [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph roll roof (AR01)	Rolled roofing	0.15 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Wood Sft 3/4 in (WD01)	Wood Sft 3/4 in (1.9 cm)	0.94 (m² • °K)/W	0.019049 m	0.115440 W/(m • °K)	512.640000 kg/m³	1381.644000 J/(kg • °K)
Minwool batt R11 w/ 2x4 frame	Batt, R-11 including framing factor	8.75 (m² • °K)/W	-	-	-	-
GypBd 5/8 in (GP02)	GypBd 5/8 in (1.6 cm)	0.56 (m² • °K)/W	0.015879 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-22 insulated panels

U-Value: 0.237473 W/(m² • °K)

Structurally ins. panel (SIP) 6 1/2 in (162 mm) roof, 48 in o.c., R-22 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph siding (AR02)	Shingle and siding	0.44 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 5 1/2 in w/48 in oc SIP roof frame	Polystyrene 5 1/2 in (140 mm) including SIP roof frame factor	21.4 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m²	0.012710 m	0.160266 W/(m	801.000000	837.360000

		• °K)/W		• °K)	kg/m³	J/(kg • °K)

R-28 insulated panels

U-Value: 0.189207 W/(m² • °K)

Structurally ins. panel (SIP) roof 8 1/4 in (210 mm) thick, 48 in o.c., R-28 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph siding (AR02)	Shingle and siding	0.44 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 7 1/4 in w/48 in oc SIP roof frame	Polystyrene 7 1/4 in (180 mm) including SIP roof frame factor	27.5 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

R-36 insulated panels

U-Value: 0.150576 W/(m² • °K)

Structurally ins. panel (SIP) roof 10 1/4 in (260 mm)thick, 48 in o.c., R-36 insulation [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Asph siding (AR02)	Shingle and siding	0.44 (m² • °K)/W	-	-	-	-
Bldg paper felt (BP01)	Permeable felt	0.06 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
Polystyrene 9 1/4 in w/48 in oc SIP roof frame	Polystyrene 9 1/4 in (230 mm) including SIP roof frame factor	35.2 (m² • °K)/W	-	-	-	-
Plywd 5/8 in (PW04)	Plywd 5/8 in (1.6 cm)	0.78 (m² • °K)/W	0.015879 m	0.115440 W/(m • °K)	544.680000 kg/m³	1214.172000 J/(kg • °K)
GypBd 1/2 in (GP01)	GypBd 1/2 in (1.3 cm)	0.45 (m² • °K)/W	0.012710 m	0.160266 W/(m • °K)	801.000000 kg/m³	837.360000 J/(kg • °K)

Ballast, 2 in polystyrene, screed, concrete, plaster

U-Value: 0.51 W/(m² • °K)

Ballast (chips or paving slab), 2 in (50 mm) extruded polystyrene insulation, waterproof roof covering, 3 in (75 mm) screed, 6 in (150 mm) cast concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Ballast (chips or paving slab)	Ballast (chips or paving slab)	-	- m	0.96 W/(m • °K)	1800 kg/m³	1000 J/(kg • °K)
Extruded polystyrene insulation	Extruded polystyrene insulation	-	0.050 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg •

						°K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Ballast, 4 in polystyrene, screed, concrete, plaster

U-Value: 0.30 W/(m² • °K)

Ballast (chips or paving slab), 4 in (100 mm) extruded polystyrene insulation, waterproof roof covering, 3 in (75 mm) screed, 6 in (150 mm) cast concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Ballast (chips or paving slab)	Ballast (chips or paving slab)	-	- m	0.96 W/(m • °K)	1800 kg/m³	1000 J/(kg • °K)
4 in Extruded polystyrene insulation	4 in (100 mm) Extruded polystyrene insulation	-	0.100 m	0.035 W/(m • °K)	25 kg/m³	1400 J/(kg • °K)
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Waterproof covering, screed, cast concrete, dense plaster

U-Value: 2.05 W/(m² • °K)

Waterproof covering, 3 in (75 mm) screed, 6 in (150 mm) cast concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Waterproof covering, polyurethane, screed, concrete, plaster

U-Value: 0.53 W/(m² • °K)

Waterproof roof covering, 1 1/4 in (32 mm) polyurethane insulation, vapor control layer, 3 in (75 mm) screed, 6 in (150 mm) cast concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
1 1/4 in polyurethane insulation	1 1/4 in (32 mm) polyurethane insulation	-	0.035 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Vapour control layer	Vapour control layer	-	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg • °K)

1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Waterproof covering, polyurethane, screed, concrete, plaster

U-Value: 0.22 W/(m² • °K)

Waterproof roof covering, 4 in (100 mm) polyurethane insulation, vapour control layer, 3 in (75 mm) screed, 6 in (150 mm) cast concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
4 in polyurethane insulation	4 in (100 mm) polyurethane insulation	-	0.100 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Vapour control layer	Vapour control layer	-	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Waterproof covering, polyurethane, screed, concrete, plaster

U-Value: 0.12 W/(m² • °K)

Waterproof roof covering, 8 in (200 mm) polyurethane insulation, vapour control layer, 3 in (75 mm) screed, 6 in (150 mm) cast concrete, 1/2 in (12 mm) dense plaster [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
8 in polyurethane insulation	8 in (200 mm) polyurethane insulation	-	0.200 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Vapour control layer	Vapour control layer	-	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Screed	Screed	-	0.075 m	0.41 W/(m • °K)	1200 kg/m³	840 J/(kg • °K)
Cast concrete	Cast concrete	-	0.150 m	1.13 W/(m • °K)	2000 kg/m³	1000 J/(kg • °K)
1/2 in plaster (dense)	1/2 in (12 mm) plaster (dense)	-	0.013 m	0.5 W/(m • °K)	1300 kg/m³	1000 J/(kg • °K)

Waterproof covering, timber decking, plasterboard

U-Value: 1.87 W/(m² • °K)

Waterproof roof covering, 3/4 in (19 mm) timber decking, ventilated airspace, vapour control layer, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
Timber decking	Timber decking	-	0.019 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Flat roof airspace	Flat roof airspace	0.16 (m² • °K)/W	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Vapour control layer	Vapour control layer	-	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)

Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Waterproof covering, mineral fiber insulation, plasterboard

U-Value: 0.51 W/(m² • °K)

Waterproof roof covering, 3/4 in (19 mm) timber decking, ventilated airspace, 2 in (50 mm) mineral fiber insulation, vapour control layer, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
Timber decking	Timber decking	-	0.019 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Flat roof airspace	Flat roof airspace	0.16 (m² • °K)/W	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Mineral fiber insulation	Mineral fiber insulation	-	0.050 m	0.035 W/(m • °K)	30 kg/m³	1000 J/(kg • °K)
Vapour control layer	Vapour control layer	-	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Waterproof covering, 1 1/4 in polyurethane, decking, plasterboard

U-Value: 0.52 W/(m² • °K)

Waterproof roof covering, 1 1/4 in (32 mm) polyurethane insulation, vapour control layer, 3/4 in (19 mm) timber decking, unventilated airspace, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
1 1/4 in polyurethane insulation	1 1/4 in (32 mm) polyurethane insulation	-	0.035 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Vapour control layer	Vapour control layer	-	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Timber decking	Timber decking	-	0.019 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Pitched roof airspace	Pitched roof airspace	0.18 (m² • °K)/W	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Waterproof covering, 4 in polyurethane, decking, plasterboard

U-Value: 0.22 W/(m² • °K)

Waterproof roof covering, 4 in (100 mm) polyurethane insulation, vapour control layer, 3/4 in (19 mm) timber decking, unventilated airspace, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
4 in polyurethane insulation	4 in (100 mm) polyurethane insulation	-	0.100 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Vapour control layer	Vapour control layer	-	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Timber decking	Timber decking	-	0.019 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Pitched roof airspace	Pitched roof airspace	0.18 (m² • °K)/W	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

Waterproof covering, 8 in polyurethane, decking, plasterboard

U-Value: 0.12 W/(m² • °K)

Waterproof roof covering, 8 in (200 mm) polyurethane decking, insulation, vapour control layer, 3/4 in (19 mm) timber unventilated airspace, 1/2 in (12 mm) plasterboard [Source: CIBSE]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Waterproof roof covering	Waterproof roof covering	-	- m	0.19 W/(m • °K)	960 kg/m³	840 J/(kg • °K)
8 in polyurethane insulation	8 in (200 mm) polyurethane insulation	-	0.200 m	0.025 W/(m • °K)	30 kg/m³	1400 J/(kg • °K)
Vapour control layer	Vapour control layer	-	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Timber decking	Timber decking	-	0.019 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)
Pitched roof airspace	Pitched roof airspace	0.18 (m² • °K)/W	- m	- W/(m • °K)	- kg/m³	- J/(kg • °K)
Plasterboard	Plasterboard	-	0.012 m	0.16 W/(m • °K)	950 kg/m³	840 J/(kg • °K)

MEP Constructions for Buildings and Spaces

Slabs

Standard slab construction - A

U-Value: 0.2499 W/(m² • °K)

Standard slab construction

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.200 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Standard slab construction - B

U-Value: 0.4063 W/(m² • °K)

Standard slab construction

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.200 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Solid-ground floor

U-Value: 0.4063 W/(m² • °K)

Solid-ground floor

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.200 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Suspended timber floor

U-Value: 0.3857 W/(m² • °K)

Suspended timber floor

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Industrial solid

U-Value: 0.4082 W/(m² • °K)

Solid-ground floor - industry

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.200 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Un-insulated solid

U-Value: 0.7059 W/(m² • °K)

Un-insulated Solid-ground floor

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.200 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Un-insulated suspended timber

U-Value: 0.6278 W/(m² • °K)

Un-insulated Suspended timber floor

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Timber flooring	Timber flooring	-	0.1 m	0.14 W/(m • °K)	650 kg/m³	1200 J/(kg • °K)

Super-insulated

U-Value: 0.2756 W/(m² • °K)

Super-insulated floor

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
Carpet	Carpet	-	0.0127 m	0.06 W/(m • °K)	288 kg/m³	1380 J/(kg • °K)
R-34 insulation	R-34 insulation	34 (m² • °K)/W	-	-	-	-
Concrete cast dense reinforced	Concrete cast dense reinforced	-	0.200 m	1.90 W/(m • °K)	2300 kg/m³	840 J/(kg • °K)

Slab edge uninsulated

U-Value: 0.27 W/(m² • °K)

Slab edge uninsulated [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
UG surface fictitious insulation	Fictitious insulation place holder	30 (m² • °K)/W	-	-	-	-
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Carpet fiber pad (CP01)	With fibrous pad	2.08 (m² • °K)/W	-	-	-	-

Slab edge R-5 insulation

U-Value: 0.15 W/(m² • °K)

Slab edge R-5 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
UG surface fictitious insulation	Fictitious insulation place holder	30 (m² • °K)/W	-	-	-	-
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Carpet fiber pad (CP01)	With fibrous pad	2.08 (m² • °K)/W	-	-	-	-

Slab edge R-10 insulation

U-Value: 0.116 W/(m² • °K)

Slab edge R-10 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
UG surface fictitious insulation	Fictitious insulation place holder	30 (m² • °K)/W	-	-	-	-
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Carpet fiber pad (CP01)	With fibrous pad	2.08 (m² • °K)/W	-	-	-	-

Slab edge R-15 insulation

U-Value: 0.11 W/(m² • °K)

Slab edge R-15 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
UG surface fictitious insulation	Fictitious insulation place holder	30 (m² • °K)/W	-	-	-	-
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Carpet fiber pad (CP01)	With fibrous pad	2.08 (m² • °K)/W	-	-	-	-

Slab edge R-20 insulation

U-Value: 0.1 W/(m² • °K)

Slab edge R-20 insulation [Source: GBS]

Material	Description	R-Value	Thickness	Conductivity	Density	Specific Heat
UG surface fictitious insulation	Fictitious insulation place holder	30 (m² • °K)/W	-	-	-	-
Soil 8 in	Soil 8 in (20.3 cm)	0.67 (m² • °K)/W	0.204206 m	1.730735 W/(m • °K)	1842.300000 kg/m³	837.360000 J/(kg • °K)
Conc heavyweight 140lb 8 in (CC05)	Conc heavyweight 140lb 8 in (20.3cm)	0.88 (m² • °K)/W	0.203200 m	1.311205 W/(m • °K)	2242.800000 kg/m³	837.360000 J/(kg • °K)
Carpet fiber pad (CP01)	With fibrous pad	2.08 (m² • °K)/W	-	-	-	-