Earth-ship based home graduation design for a modified earthship to encourage the method of building with soil-based materials

Lafleur, R.L.M.

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Earth-Ship Based Home

Graduation design for a modified Earthship to encourage the method of building with soil-based materials.

- TECHNICAL DETAILS -

R.L.M. LAFLEUR
Earth-Ship Based Home

Graduation design for a modified Earthship to encourage the method of building with soil-based materials.

- TECHNICAL DETAILS -

Project: M4
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Author: R.L.M. Lafleur
r.l.m.lafleur@student.tue.nl
roellafleur.wix.com/portfolio

Date: January, 2015

Location: Eindhoven University of Technology
Faculty Architecture, Building and Planning
Den Dolech 2
5612 AZ Eindhoven

Graduation committee:
ir. L.A. van Schaijk
prof. dr. ir. H.J.H. Brouwers
ir. D.W. Bruggink

Eindhoven University of Technology
Eindhoven University of Technology
ORGA Architect
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Introduction

This booklet contains the technical details regarding the Earth-Ship Based Home design. Part A of this booklet includes the plans and sections of the design, in which the elaborated details from part B are designated. The technical details are divided in vertical and horizontal details. V01 means vertical detail 01 and H02 means horizontal detail 02. To make clear where each detail is located in the design, a three-dimensional impression on each page shows where the related element is sectioned.

The thermal resistance performance per element is given in each detail. All elements (except for windows) meet the minimum required thermal resistance of 5.0 m².k/W. The details cannot be compared with standard details. This due to the used materials, especially the Compressed Earth Blocks. It is a fragile material in case of attaching elements to. This can also be seen in the drawn details.
A DRAWINGS
B DETAILS
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16*33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 85mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks, 210mm.
- jute reinforcement mesh
- loam finishing with expanded perlite; 15mm.
**Section of detail V01**

### Properties of vault structure

- **Rc value**: 5.00 m².K/W
- **damp open**
- **hydrophobic finishing material**

### Properties of glass façade

- **Rc value**: 1.32 m².K/W
- **LTA**: 72%

### Additional notes

- The water drain is needed to discharge water which is collected on the horizontal glass. The drain must be checked from time to time for blockages due to leaves for example.
- Water drain in window frame is equipped with aluminum bottom to prevent the rot of wood.
- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- The window frames need to be finished with a white coloured damp open paint.
- Terracotta panels in this detail are unglazed.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
passive house window frame

water retaining & diffusion open foil

wall structure; $R_c = 5.25 \text{ m}^2 \text{ K/W}$
- trasslime mortar; 23mm.
- synthetic reinforcement mesh
- compression resistant wood fibreboard; 22mm.
- wooden beams, 38*160mm.
- biofoam insulation; 160mm.
- compressed earth blocks; 280mm.
- jute reinforcement mesh
- loam finishing; 15mm.

additional jute reinforcement mesh

stuc-stop profile

water retaining & diffusion open foil

$P=0.000$
Section of detail V02

Properties of exterior wall structure

- **R**<sub>c</sub> value: 5.25 m².K/W
- Damp open
- Hydrophobed finishing material

Properties of glass façade

- **R**<sub>c</sub> value: 1.32 m².K/W
- LTA: 72%

Properties of floor structure

- **R**<sub>c</sub> value: 1.87 m².K/W

Additional notes

- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- The window frames need to be finished with a white coloured damp open paint.
- In consultation with future inhabitants, it must be considered to apply an additional floor heating in the top layers (compression resistant wood fibreboard layers) of the floor structure. This is also explained in paragraph 10.1 of the booklet ‘Master thesis’.
- Wooden framework must be connected to the Compressed Earth Blocks wall by means of steel anchors.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- The gutter is properly sloped.
wall structure; $R_c = 5.25 \text{ m}^2\text{K/W}$
- trasslime mortar; 23mm.
- synthetic reinforcement mesh
- compression resistant wood fibreboard; 22mm.
- wooden beams, 38*160mm.
- biofoam insulation; 160mm.
- compressed earth blocks; 280mm.
- jute reinforcement mesh
- loam finishing; 15mm.

floor structure
- slite tiles, 8mm.
- trasslime mortar, 12mm.
- compression pressure resistant wood fibreboard; 22mm.
- compression resistant wood fibreboard; 22mm.
- ecoboard, 18mm.
- wooden beams; 71*246mm / 300mm. c.t.c.
- pressure resistant wood fibreboard; 22mm.
- jute reinforcement mesh
- loam finishing; 15mm.
Section of detail V03

Properties of **exterior wall structure**
- $R_c$ value: 5.25 m$^2$/K/W
- **damp open** finishing material
- **hydrophobic** finishing material

Properties of **glass façade**
- $R_c$ value: 1.32 m$^2$/K/W
- LTA: 72%

Properties of **floor structure**
- $R_c$ value: 1.87 m$^2$/K/W

Additional notes
- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- The window frames need to be finished with a white coloured damp open paint.
- In consultation with future inhabitants, it must be considered to apply an additional floor heating in the top layers (compression resistant wood fibreboard layers) of the floor structure. This is also explained in paragraph 10.1 of the booklet ‘Master thesis’.
- Wooden framework must be connected to the Compressed Earth Blocks wall by means of steel anchors.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- The gutter is properly sloped.
- sloped wooden tongue and groove boards; 18*125mm.
- wooden battens; 59*112mm.
- compressed earth blocks; 280mm.
- compression resistant wood fibreboard; 22mm.
- derbipure membrane; 3mm.
- gravel; 120mm.
- geotextile
Detail: Outdoor retaining wall with wood finishing
Section: -
Related details: H02

Section of detail V04

Additional notes

- Wooden tongue and groove boards (larchwood) are exposed to climatic conditions and need to be pickled.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- By means of appendix G from the booklet 'Master thesis', it is assumed that the wooden battens do not fall out of the wall due to shrinkage and expansion of both the Compressed Earth Blocks as the pinewood itself.
  It is important though how the battens are pressed in the wall structure.
passive house window frame

- gravel
- derbipure membrane; 3mm.
- compression resistant wood fibreboard; 22mm.
- wooden beams, 38*160mm.
- biofoam insulation, 160mm.
- compressed earth blocks, 280mm.
- biofoam insulation; 100mm.
- waterproof layer
- expanded clay granules.

foundation wall structure

- gravel
- derbipure membrane; 3mm.
- compression resistant wood fibreboard; 22mm.
- wooden beams, 38*160mm.
- biofoam insulation, 160mm.
- compressed earth blocks, 280mm.
- biofoam insulation; 100mm.
- waterproof layer
- expanded clay granules.
Section of detail V05

Additional notes

- Wooden tongue and groove boards (larchwood) are exposed to climatic conditions and need to be pickled.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
vault structure; $R_c = 5.0 \text{ m}^2\text{K/W}$
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16*33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 85mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks; 210mm.
- jute reinforcement mesh
- loam finishing with expanded perlite; 15mm.

slightly tilted glass layer, 6mm.
- mesh attached to wooden blocks
- stucco corner profile
- round wooden lath 34*71mm.
- water retaining foil
- trasslime mortar, 23mm.

wooden pivotal window
- additional jute reinforcement mesh
Section of detail V06

Properties of vault structure

- R\textsubscript{c} value: 5.00 m\textsuperscript{2}.K/W
- Damp open
- Hydrophobic finishing material

Properties of round pivotal window

- R\textsubscript{c} value: 0.71 m\textsuperscript{2}.K/W
- LTA: 72%

Additional notes

- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- The window frames need to be finished with a white coloured damp open paint.
- Terracotta panels in this detail are unglazed.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- The glass on top must be slightly tilted for water run-off.
vault structure; $R_c = 5.0 \text{ m}^2 K/W$
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16*33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 85mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks, 210mm.
- jute reinforcement mesh
- loam finishing with expanded perlite; 15mm.
Detail: Round pivotal window of vault structure
Section: Section B, upper storey
Related details: -

Section of detail V07

Properties of vault structure
- Rₜ value
  - 5.00 m².K/W
  - damp
  - open
  - hydrophobic finishing material

Properties of round pivotal window
- Rₜ value
  - 0.71 m².K/W
  - LTA
  - 72%

Additional notes
- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- The window frames need to be finished with a white coloured damp open paint.
- Terracotta panels in this detail are glazed.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
wall structure; $R_c = 5.25 \text{ m}^2\text{K/W}$
- trasslime mortar; 23mm.
- synthetic reinforcement mesh
- compression resistant wood fibre-board; 22mm.
- wooden beams, 38*160mm.
- biofoam insulation; 160mm.
- compressed earth blocks; 280mm.
- jute reinforcement mesh
- loam finishing; 15mm.

vault structure; $R_c = 5.0 \text{ m}^2\text{K/W}$
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16*33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 85mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks, 210mm.
- jute reinforcement mesh
- loam finishing with expanded perlite; 15mm.
Details: Junction between vault, floor and passive door frame
Section: Section B, upper storey
Related details: -

Section of detail V08

Properties of vault structure
- \( R_c \) value: 5.00 m².K/W
- \( R_c \) value: damp open
- hydrophobic finishing material

Properties of passive door element
- \( R_c \) value: 1.09 m².K/W

Properties of floor structure
- \( R_c \) value: 1.87 m².K/W

Properties of exterior wall structure
- \( R_c \) value: 5.25 m².K/W
- \( R_c \) value: damp open
- hydrophobic finishing material

Additional notes
- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- Terracotta panels in this detail are unglazed.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- The gutter is properly sloped.
- In consultation with future inhabitants, it must be considered to apply an additional floor heating in the top layers (compression resistant wood fibreboard layers) of the floor structure. This is also explained in paragraph 10.1 of the booklet ‘Master thesis’.
- Wooden framework must be connected to the Compressed Earth Blocks wall by means of steel anchors.
- Wooden floor beams are tensile stress loaded.
floor structure
- slate tiles; 8mm.
- trasslime mortar; 12mm.
- compression resistant wood fibreboard; 22mm.
- compression resistant wood fibreboard; 22mm.
- ecoboard; 18mm.
- wooden beams; 71*221mm / 600mm. c.t.c.
- compression resistant wood fibreboard; 22mm.
- jute reinforcement mesh
- loam finishing; 15mm.

vault structure Rc = 5.0 m2.K/W
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16*33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 85mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks, 210mm.
- jute reinforcement mesh
- loam finishing with expanded profile; 15mm.

water retaining & diffusion open foil

wooden cover cap

laminated wooden beam 71*221 / 1363 c.t.c.

illmond

trasslime mortar; 15mm.

laminated wooden beam 71*221mm.

stuc-stop profile

P=0.000

additional jute reinforcement mesh

wood fibreboard, 10mm.

637 - P
Detail: Junction between vault, floor and glass roof
Section: Section B, upper storey
Related details: V10, V16, V17

Section of detail V09

Properties of **vault structure**

- **Rc** value: 5.00 m².K/W
- Damp open
- Hydrophobic finishing material

Properties of **glass roof**

- **Rc** value: 0.77 m².K/W
- LTA: 79%

Properties of **floor structure**

- **Rc** value: 1.87 m².K/W

Additional notes

- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- In consultation with future inhabitants, it must be considered to apply an additional floor heating in the top layers (compression resistant wood fibreboard layers) of the floor structure. This is also explained in paragraph 10.1 of the booklet ‘Master thesis’.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- Terracotta panels in this detail are glazed.
- Laminated beams are sloped with 6 mm/m¹.
- Wooden floor beams are tensile stress loaded.
wooden beams 21x221mm, 300mm c.t.c.
wooden blocks 34x135mm; 88mm c.t.c.

mesh attached to wooden blocks

wooden cover cap
Section of detail V10

Properties of glass roof

- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- Terracotta panels in this detail are unglazed.
- Laminated beams are sloped with 6 mm/m¹.
- Rain gutter needs to be checked regularly, to avoid water and soil from flowing over the edge.
tempered glass, 6mm.

illmond

compression resistant wood fibreboard, 20mm.

slate tiles, 8mm.

tasslime mortar, 12mm.

sand-lime bricks, 214mm.

expanded clay granules, 230 mm.

soil as infill
Detail: Connection of railing to structure below
Section: Section B, lower storey
Related details: -

Section of detail V11

Additional notes
- Illmond between slate tiles is needed to avoid cracks due to deformation of the substrate materials (sand-lime bricks and wood fibreboard).
white DerbiPure membrane material

curved triplex, 12mm.

multiplex, 21mm.

vaulted wooden beams; 71*221mm / 840mm. c.t.c.

glass layer, 6mm.

assembled wooden frame
**Detail:** Top of glass vault structure  
**Section:** Section C, upper storey  
**Related details:** V13, V14

**Section of detail V12**

**Properties of glass façade vault structure**

- $R_z$ value: **0.05** m$^2$.K/W  
- LTA: **90%**

**Additional notes**

- Wooden vaulted beams and board material are exposed to climatic conditions and need to be pickled.  
- The window frames need to be finished with a white coloured damp open paint.
- vaulted wooden beams; 71*221mm / 840mm. c.t.c.
- compression resistant wooden fibreboard; 52mm.
- illmond

water retaining & diffusion open foil

vault structure; Rc = 5.0 m².K/W
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16*33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 85mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks; 210mm.
- jute reinforcement mesh
- loam finishing with expanded perlite; 15mm.
Detail: Connection between vault structures
Section: Section C, upper storey
Related details: V12

Additional notes
- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- Terracotta panels in this detail are unglazed.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- Wooden vaulted beams are exposed to climatic conditions and need to be pickled.
wall structure; $R_c = 5.25 \, \text{m}^2\cdot\text{k}/\text{W}$
- trasslime mortar; 23mm.
- synthetic reinforcement mesh
- compression resistant wood fibreboard; 22mm.
- wooden beams, 38*160mm.
- biofoam insulation; 160mm.
- compressed earth blocks; 280mm.
- jute reinforcement mesh
- loam finishing; 15mm.

floor structure; $R_c = 5.14 \, \text{m}^2\cdot\text{k}/\text{W}$
- top soil; 400mm.
- derbipure roofing; 3mm.
- compression resistant wood fibreboard; 22mm.
- compression resistant wood fibreboard; 22mm.
- ecoboard, 18mm.
- wooden beams; 71*246mm / 300mm. c.t.c.
- wood fibreboard insulation, 120mm
- compression resistant wood fibreboard; 22mm.
- wooden battens, 20*33mm.
- ecoboard, 18mm.
- jute reinforcement mesh
- loam finishing; 15mm.
**Section of detail V14**

**Properties of exterior wall structure**

- **R\text{c} value**: 5.25 m².K/W
- **damp open**
- **hydrophobic finishing material**

**Properties of glass façade vault structure**

- **R\text{c} value**: 0.05 m².K/W
- **LTA**: 90%

**Properties of tilt and turn window**

- **R\text{c} value**: 1.27 m².K/W
- **LTA**: 72%

**Properties of floor structure**

- **R\text{c} value**: 5.18 m².K/W

**Additional notes**

- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- The window frames need to be finished with a white colored damp open paint.
- Wooden framework must be connected to the Compressed Earth Blocks wall by means of steel anchors.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- The gutter is properly sloped.
- Vaulted wooden beams are attached to steel anchors (fixed connection), which are fixed to horizontal wooden beams.
- top soil; 400mm.
- derbipure roofing; 3mm.
- compression resistant wood fibreboard; 22mm.
- compression resistant wood fibreboard; 22mm.
- ecoboard, 18mm.
- wooden beams; 71*246mm / 300mm. c.t.c.
- wood fibreboard insulation, 120mm
- compression resistant wood fibreboard; 22mm.
- wooden battens, 20*33mm.
- ecoboard, 18mm.
- jute reinforcement mesh
- loam finishing; 15mm.

floor structure = 5.14 m².K/W

wooden pivotal window

400+P

circular glass panel

wooden sliding plate as sun blind

stuc-stop profile
Detail: Round pivotal window in indoor garden
Section: Section C, upper storey
Related details: V14

Properties of floor structure

- $R_c$ value: 5.18 m².K/W

Properties of horizontal pivotal window

- $R_c$ value: 0.54 m².K/W
- LTA: 72%

Additional notes

- The window frames need to be finished with a white coloured damp open paint.
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16*33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 85mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks, 210mm.
- jute reinforcement mesh
- loam finishing with expanded perlite; 15mm.

vault structure; Rc = 5.0 m2.KW

aluminum sealing profile
aluminum corner line
tempered glass
laminated glass

water discharge
tube Ø80mm.
trasslime mortar; 15mm.
laminated wooden beam 71*385 / 1363 c.t.c.
ecoboard, 18mm.
in indoor window frame
Section of detail V16

Properties of **vault structure**

- $R_c$ value: 5.00 m$^2$.K/W
- Damp open
- Hydrophobic finishing material

Properties of **glass roof**

- $R_c$ value: 0.77 m$^2$.K/W
- LTA: 79%

Properties of **floor structure**

- $R_c$ value: 1.87 m$^2$.K/W

Properties of **indoor window**

- $R_c$ value: 0.68 m$^2$.K/W
- LTA: 79%
- LTA*: 62%

**Additional notes**

- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- Terracotta panels in this detail are glazed.
- Laminated beams are sloped with 6 mm/m.
- Aluminum sealing profile is meant to keep leaves from getting into the sink. However, clogging may happen. The sink must be checked regularly in order to avoid damage to the structure due to water overflow.
- The window frames need to be finished with a white coloured damp open paint.
- Wooden floor beams are tensile loaded.
- The gutter is properly sloped.

* The percentage of daylight that goes through the glass is only 62%, because it was already filtered by the glass roof.
vault structure; \( R_c = 5.0 \text{ m}^2 \text{K/W} \)
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16’33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 85mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks, 210mm.
- jute reinforcement mesh
- loam finishing with expanded perlite; 15mm.

floor structure
- sile tiles, 8mm.
- trasslime mortar, 12mm.
- compression resistant wood fibreboard; 22mm.
- compression resistant wood fibreboard; 22mm.
- ecoboard, 18mm.
- wooden beams; 71’246mm / 300mm. c.t.c.
- compression resistant wood fibreboard; 22mm.
- jute reinforcement mesh
- loam finishing; 15mm.
**Detail:** Junction between vault and laminated beam  
**Section:** Section D, upper storey  
**Related details:** V09, V10, V16, V18

Section of detail V17

**Properties of vault structure**
- $R_c$ value: 5.00 m$^2$.K/W
- Damp open
- Hydrophobic finishing material

**Properties of glass roof**
- $R_c$ value: 0.77 m$^2$.K/W
- LTA: 79%

**Properties of floor structure**
- $R_c$ value: 1.87 m$^2$.K/W

**Additional notes**
- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- Terracotta panels in this detail are glazed.
- Laminated beams are sloped with 6 mm/m$^1$.
- Wooden floor beams are tensile stress loaded.
ground floor structure; $R_c = 5.54 \text{ m}^2\text{K/W}$
- slate tiles, 8mm.
- trasslime mortar, 12mm.
- compression resistant wood fibreboard, 20mm.
- vapor control layer.
- biofoam insulation, 100mm.
- water retaining layer.
- trasslime mortar, 30mm.
- expanded clay granulates, 250mm.
- gravel 320mm.

wooden beams 71*114mm.
trasslime mortar, 25mm.
glazed terracotta panels, 30mm.

loam finishing, 15mm.
ecoboard, 22mm.
Section of detail V18

Properties of indoor window

- **Rc value**: 0.68 m².K/W
- **LTA**: 79%
- **LTA***: 62%

Properties of floor structure

- **Rc value**: 5.54 m².K/W
- **damp proof**

Additional notes

- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- Terracotta panels in this detail are glazed.
- Laminated beams are sloped with 6 mm/m².
- The window frames need to be finished with a white coloured damp open paint.
- Creep of the biofoam insulation - due to compressive forces of the indoor window - is prevented by applying a wooden beam beneath the bottom frame, which transfers the forces towards the foundation.

* The percentage of daylight that goes through the glass is only 62%, because it was already filtered by the glass roof.
ground floor structure; $R_c = 5.54 \text{ m}^2\text{K/W}$
- slate tiles, 8mm.
- trasslime mortar, 12mm.
- vapor control layer.
- wood fibreboard insulation, 20mm.
- biofoam insulation, 100mm.
- water retaining layer.
- trasslime mortar, 30mm.
- expanded clay granules, 250mm.
- gravel 320mm.

wall structure; $R_c = 3.34 \text{ m}^2\text{K/W}$
- wooden cladding of larch hardwood; 16*67mm.
- wooden battens; 22*33mm.
- compression resistant wood fibreboard; 18mm.
- vapor control layer.
- wooden beams, 38*100mm.
- wood fibreboard insulation; 100mm.
- compression resistant wood fibreboard; 18mm.
- jure reinforcement mesh
- loam finishing; 15mm.

corner element of wooden cladding; 67*118mm.

wooden strip to support corner element; 22*34mm.
Detail: Window frame of indoor wall in bathroom
Section: Section D, lower storey
Related details: -

Section of detail V19

Properties of **indoor window**
- Rₜ value: 1.41 m².K/W
- LTA: 72%

Properties of **floor structure**
- Rₜ value: 5.54 m².K/W
- Damp proof

Properties of **indoor wall structure**
- Rₜ value: 3.34 m².K/W
- Damp proof

Additional notes
- Creep of the biofoam insulation - due to compressive forces of the indoor wall structure - is prevented by applying a wooden beam beneath the structure, which transfers the forces towards the foundation.
vault structure; $R_c = 5.0 \text{ m}^2\text{K/W}$
- curved terracotta panels; 30mm.
- trasslime mortar; 20mm.
- synthetic reinforcement mesh
- curved triplex; 8mm.
- air cavity; 16mm.
- battens of curved triplex; 16x33mm.
- water retaining & diffusion open foil
- perforated curved triplex; 16 mm.
- wood fibreboard insulation; 80mm.
- wood fibreboard insulation; 100mm.
- compressed earth blocks, 210mm.
- jute reinforcement mesh
- loam finishing with expanded perlite; 15mm.

wooden fibreboard insulation, 52mm.
water retaining & diffusion open foil
**Detail:** Edge of vault structure and glass façade

**Section:** Upper storey

**Related details:** V01, V02, V03

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**Section of detail H01**

**Properties of vault structure**

- **Rc value:** 5.00 m²·K/W
- **damp open**
- **hydrophobic finishing material**

**Properties of glass façade**

- **Rc value:** 1.32 m²·K/W
- **LTA:** 72%

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**Additional notes**

- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- The window frames need to be finished with a white coloured damp open paint.
- Terracotta panels in this detail are unglazed.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- Wooden framework must be connected to the Compressed Earth Blocks wall by means of steel anchors.
- sloped wooden tongue and groove boards; 18*125mm.
- wooden battens; 59*112mm.
- compressed earth blocks; 280mm.
- compression resistant wood fibreboard; 22mm.
- derbipure membrane; 3mm.

- trasslime mortar; 23mm.
- synthetic reinforcement mesh
- compression resistant wood fibreboard; 22mm.
- wooden beams, 38*160mm.
- biofoam insulation; 160mm.
- compressed earth blocks; 280mm.
- jute reinforcement mesh
- loam finishing; 15mm.

- slope wood fibreboard, 18mm.
- additional jute reinforcement mesh

- retaining wall structure; Rc = 5.27 m² K/W
- loam finishing, 15mm.
- compressed earth blocks; 280mm.
- biofoam insulation, 160mm.
- wooden beams 38*160mm.
- compression resistant wood fibreboard; 22mm.
- derbipure membrane; 3mm.
Section of detail H02

Properties of **tilt and turn window**

- $R_v$ value: **1.27** m$^2$.K/W
- LTA: **72%**

Properties of **retaining wall structure**

- $R_v$ value: **5.27** m$^2$.K/W
- **damp proof**

Additional notes

- Wooden tongue and groove boards (larchwood) are exposed to climatic conditions and need to be pickled.
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- By means of appendix G from the booklet 'Master thesis', it is assumed that the wooden battens do not fall out as a result of the way the battens are inserted in the wall structure.
- Hydrophobization of finishing materials must be done every three years and must be done on a dry surface.
- The window frames need to be finished with a white coloured damp open paint.
- Wooden framework must be connected to the Compressed Earth Blocks wall by means of steel anchors.
Bottom detail glass façade

Section: Section A, upper storey

Related details: V01, V02, H01

- water retaining foil
- passive window frame

floor structure:
- slite tiles, 8mm.
- trasslime mortar, 12mm.
- compression pressure resistant wood fibreboard; 22mm.
- ecoboard, 18mm.
- wooden beams; 71*246mm / 300mm. c.t.c.
- pressure resistant wood fibreboard; 22mm.
- jute reinforcement mesh
- loam finishing; 15mm.

water discharge:
- Ø80mm. tube

exterior wall structure; Rc = 5.25 m2K/W:
- trasslime mortar; 23mm.
- pressure resistant wood fibreboard; 22mm.
- wooden beams, 38*160mm.
- biofoam insulation; 160mm.
- compressed earth blocks; 280mm.
  equipped with wall heating system.
- jute reinforcement mesh
- loam finishing; 15mm.
Details:
- Window frames exterior wall

Section:
- Lower storey

Related details:
- V05, H02

Section of detail H03

Properties of **tilt and turn window**
- R\text{ value} \quad 1.38 \quad \text{m}^2\text{.K/W}
- LTA \quad 72\%

Properties of **exterior wall structure**
- R\text{ value} \quad 5.25 \quad \text{m}^2\text{.K/W}
- Damp open
- Hydrophobed finishing material

Additional notes
- It is important to protect the Compressed Earth Blocks from any form of precipitation during construction.
- Hydrophobization of finishing materials must be done each three years and must be done on a dry surface.
- The window frames need to be finished with a white coloured damp open paint.
- Wooden framework must be connected to the Compressed Earth Blocks wall by means of steel anchors.
- Retaining wall with wood finishing
- Details:
  - Sloped wooden tongue and groove boards; 18*125mm.
  - Wooden battens; 55*33mm.
  - Compressed earth blocks; 280mm.
  - Compression resistant wood fibreboard; 18mm.
  - Vapor control layer
  - Wooden beams, 38*100mm.
  - Wood fibreboard insulation; 100mm.
  - Compression resistant wood fibreboard; 18mm.
  - Loam finishing; 15mm.
- Wall structure; $R_c = 3.34 \text{ m}^2\cdot\text{K/W}$
- HR++ glazing
- Passive window frame
- Steel anchor
- Trasslime mortar; 12mm.
- Loam finishing; 15mm.
- Compressed earth blocks; 228mm.
Detail: Connection of indoor walls bathroom

Section: Lower storey

Related details: V19

Section of detail H04

Properties of **indoor window**

- **R**<sub>c</sub> value: 1.29 m².K/W
- LTA: 72%

Properties of **indoor wall structure** with CEBs

- **R**<sub>c</sub> value: 1.38 m².K/W

Properties of **indoor wall structure** with framework

- **R**<sub>c</sub> value: 3.34 m².K/W
- damp proof

**Additional notes**

- The window frames need to be finished with a white coloured damp open paint.
- Creep of the biofoam insulation - due to compressive forces of the indoor wall structure - is prevented by applying a wooden beam beneath the structure, which transfers the forces towards the foundation.
- The indoor CEB wall is insulated to heat transmission from the bathroom to the laundry room.
- Indoor walls are connected by means of steel anchors.