DRY CONSTRUCTION SYSTEMS

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Dry construction systems

- Prefabricated elements → assembly on site
- Minimal use of water → „dry" construction systems
  - Assembled partitions
  - Suspended ceilings
  - Raised floor systems
  - Dry screeds, dry linings

  Finishing works
  - **Prefabricated elements of loadbearing structures**

Dry construction systems

- Materials
  - Timber
  - Metal (steel)
  - Precast reinforced concrete
- Technologies
  - (Traditional technology)
  - On-site assembly – small elements
  - On-site assembly – panels
  - Log houses

- Construction systems
  - „Light" construction: weight of outer walls is less than 300kg/m^2

Regulation

- Standards and other
  - ÖNORM B 2310: Prefabricated buildings – Definitions (independent from the material)
  - ÖNORM B 2320: Wooden residential houses - Technical requirements
  - REGULATION (EU) No 305/2011harmonised conditions for the marketing of construction products – doesn't contain specific information on dry construction systems
  - ETAG
    - For metal frames;
    - For timber frames;
    - For log houses.
  - Approval for a whole system

Metal frames

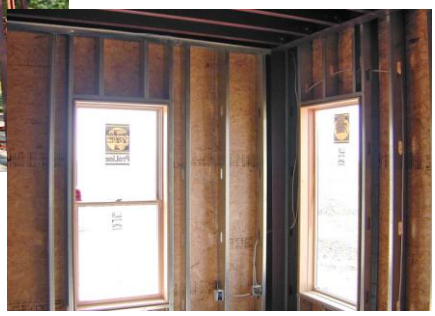
- Material is cold formed or hot rolled galvanised steel
  - C studs, I beams, U beams etc.
- The frame is cut and packed in a factory
- The package is transported to the site
- The frame is assembled on a previously completed foundation/basement connections are made with screws
- Installing insulation, covering, wires pipes, doors and windows etc.

Metal frames

- Packages are available:
  - model homes, ready plans,
  - customisation or individual plans,
  - production using architectural plans
- Packages contain:
  - Engineered drawings (architectural, structural drawings)
  - Structural elements: studs, joists, trusses, purlins, connector plates, steel to steel fasteners, etc.
  - OR prefabricated panels: wall frames, ceiling panels roof panels
  - Optional: panels, claddings, doors and windows, etc.

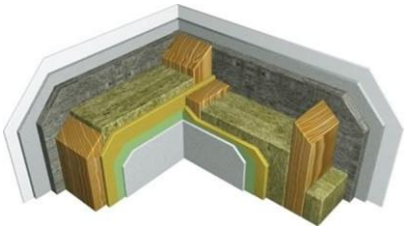
Metal frames

Metal frames

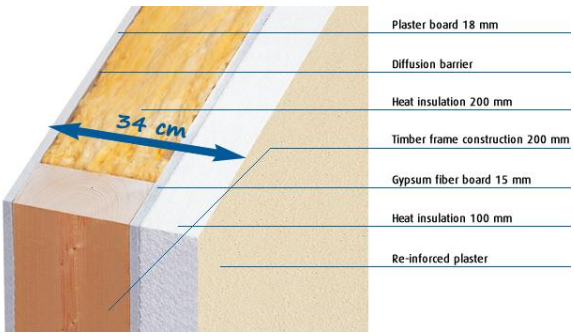


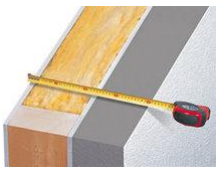
Timber frames

- Skeleton frame
  - Standardised dimensional lumber
  - Nailed/screwed connections (nailing plates)
- Lining/covering
  - OSB sheathing board
  - Plywood
  - Gypsum board, plasterboard
  - Fiber cement panels
- Insulation, waterproofing, moisture barrier



Timber frames





Timber frames

- Technology:
  - Low level prefabrication – elements cut and labelled in factory;
  - Mid-level prefabrication – wall-, roof-, slab panels are produced: frame and lining;
  - High level prefabrication – wall-, roof-, slab panels are ready-made in factory, with coverings, claddings, doors and windows, wires, etc.
  - On-site assembly – speed, demand on equipment depends on the level of prefabrication

Timber frames

- Technology steps:

1. Choosing the preferred house style from catalogues
2. A fixed price quote with a guaranteed completion date is given
3. Selecting finishes, fixtures and fittings
4. The wall and roof panels for the house, pre-fitted with doors, windows, service ducts, sockets and insulation, are precision-engineered in the factory
5. The panels arrive on site by truck, the team of skilled tradesmen start to work
6. The house is roofed and watertight within four days
7. The house is ready in 8-12 weeks

Timber frames

- Prefabrication
  - In a factory – professional environment
  - One level high wall panels from edge to edge




Timber frames

- Prefabrication, details



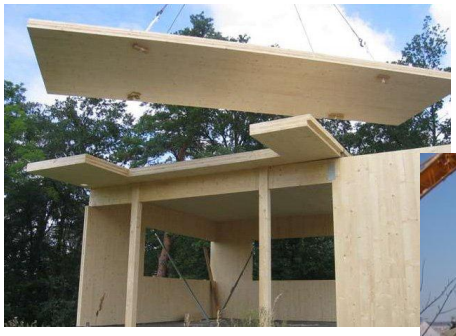
Timber panels

- Solid wood panels: cross laminated timber
  - Walls and slabs are prefabricated
  - Assembly on site
  - Complementary layers: heat insulation, rendering, internal covering
  - Measures: thickness: 94-500 mm, height: max. 2950 mm,
  - Lenght: max. 16500 mm.

Timber panels

- Solid wood panels: production

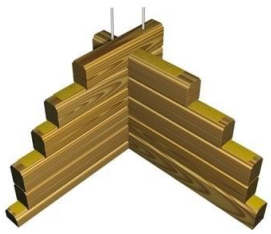
Timber panels



- Assembly on site

Log houses

- Log types
  - Handcrafted – only peeled
  - Milled (machine-profiled) - consistent in size and appearance
  - Material usually artificially dried and/or glue laminated – constant quality
  - Full-round logs;
  - D-shape logs;
  - Square logs;
  - Swedish Cope logs;
  - Sandwich structures – heat insulated.



Log houses

- Prefabrication: beams
- Each beam is numbered and the position is indicated

Log houses

- Construction:
  - The first row of beams is laid out on the basement ceiling/floor slab and measured with precision.
  - Following on from this, the log beams are laid out in the same sequence as their numbering.

Dry construction systems

- Supposed advantages:
  - Full service (design, build, finance);
  - Fixed prices;
  - Fast construction;
  - Guaranteed quality;
  - Low energy consumption…
- Supposed disadvantages:
  - Lifespan;
  - Safety (storm, burglary, fire …);
  - No thermal mass…
- It depends on the chosen technology and the contractor!

Dry construction systems

- Facts in case of approved product and qualified contractor:
  - The construction time can be planned – prefabrication is independent from local conditions. On-site activities: mainly assembly.
  - Well-planned building.
  - Very precise construction.
  - Improving regulation.

Dry construction systems

- Problem-sources:
  - Problems with the planning – using a system
  - Different regulation at the production and the construction
  - Self-made realisation
  - Foundation/basement is usually made by a different contractor
  - Fast construction → lots of trader, workers at the same time
  - Quality of the assembly
  - Coordination and control of the processes
  - Quality of the materials (panels!)
  - Transportation and storing
  - Use (maintenance, fixing on the walls, etc.)

References

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