3. Materials and tools used during house construction.

Technical and assembly requirements for wooden construction

There are three ways of building wooden houses that can be distinguished:

1) from individual elements on the construction site,

2) from previously prepared prefabricated elements,

3) using previously made large-scale modules. The production process of residential modules is carried out in a factory. If only the design allows it, all the modules (including floor panels, installations, furniture, bathroom tiles, household appliances, etc.) are transported to the construction site where the whole building is assembled. After completing the finishing works, integration and testing of installations, the building is ready for use.

Technical and assembly requirements as well as humidity and heat conditions must be meticulously observed. For example, wood moisture should not be higher than 23% for external elements and 18% for enclosed elements.

The wood must necessarily be chamber dried, planed four-sided, with rounded or chamfered edges, with a maximum of 18% humidity. Wood for the construction of the house must meet the strength requirements contained in the standard PN-EN 338:2016-06. Constructional timber brought to production must always have a declaration of conformity confirming that the requirements set in the Polish Standard are met.

Prefabrication of houses in wooden frame technology

A house made of ready-made elements emerging in the production hall. Prefabricated elements reach the construction site in ready-to-assemble elements. The only pre-assembly work is pouring foundations. Prefabricated houses do not require wet works, so they can be assembled at any time of the year.

The wooden supporting construction consists of a system of posts resting on a horizontal beam – a sleeper anchored to the foundation. The space between the posts is filled with insulating material. Components of house including the walls, floors and roof panels are made in factory. The timber-frame components are precision-manufactured thanks to advanced digital software. Windows, doors, fire-resistant wall insulation, some service ducts and electrical connections are all installed at this time. The internal walls are either prepared for application of paint, wallpaper or tiles, or are finished according to choices. Every component of the house is given a final quality-control inspection before it leaves the factory. All house components and building materials are shipped to site on special trucks, with a team of skilled

tradesmen who are ready to start work. Massive cranes assemble individual elements of the house – typically the basic structure will be in place in one or two days. The house will be roofed and watertight within one to four days. When construction is complete, a team begins work on the interior. This includes heating and electrical installations, fitting doors, decorating, flooring and tiling to specified choices. In eight to 12 weeks house is ready to move in.

Types of prefabricated elements used to build a house:

Small-size prefabricated products. The size of small-size prefabricated elements does not exceed the height of one floor. The use of this technology greatly accelerates construction work. Individual elements can be cut at the construction site, thanks . Among the prefabricated small-size prefabricates, wood-cement boards, PVC panels and polystyrene panels are most recommended:

• Cement boards - made of wooden chips, which are pressed with water glass as well as cement mass. Slabs are laid on the foundations from the inside and outside of the house. The whole is fastened with clamps. The company's offers include both insulated and non-insulated boards.

• PVC panels - consist of chambers that must be poured with cement after installation. Such walls show high strength. After completion, the panels should be insulated analogously to the insulation. .

• Styrofoam panels - have a high level of thermal insulation. Each panel is reinforced with steel angles, which ensures rigidity of the supporting structure. The building does not require additional insulation.

Large-size prefabricated products. This is an interesting solution ensuring time savings for the investor. All prefabricated elements are assembled in production halls. These elements are made to order, creating niches for windows and doors. Sometimes the company also distributes installations and performs house insulation. Therefore, large-size prefabricated products are usually assembled in a few days at the construction site. We gain both durability of the house and very fast, stress-free construction. The most recommended large-size prefabricates include:

• Expanded concrete blocks - these are three-layer prefabricated elements in various sizes. They consist of a layer of expanded clay, thermal insulation and an elevation layer. The manufacturers' offers also include cheaper boards without insulation and finishing on both sides. All elements are made in the factory - a period of about 4 months elapses from the moment of ordering to the house. The house is assembled on the construction site in a few days.

• Precast concrete products - also available with insulation and a façade layer. Prefabricated elements for partition walls can additionally be plastered.

From which the structure of a wooden prefabricated house is made?

For the construction of prefabricated wooden houses, elements made of certified glued wood are used. The production of structural timber consists in cutting out from the dried beams all defects not allowed by the standard, gluing sections without flaws, four-sided sharpening and re-dividing the glued material into shorter sections (usually max. 13 meters, due to the length of truck trailers). Such wood is durable, moisture resistant and dimensionally stable.

In wooden houses, spruce wood is most often used, which is chamber dried to a moisture content of 16 percent.Wood drying technology is very important. There are no mold or fungal spores in chamber-dried wood. During drying, insect larvae are also killed and the wood brining is stopped. By drying wood at 60 degrees Celsius, the material is free of all kinds of natural substances that are breeding ground for wood pests. In addition, structural timber for the house is planed on each side, and its edges are bevelled. This makes it more resistant to fire than untreated wood. Flames of fire slide on the smooth surface of planed wood and its ignition is difficult, and this significantly increases the fire resistance of the wooden structure.

What quality wood is used?

Depending on the size of the permissible defects, wood is classified into different quality classes. The most popular is C24 construction timber. The load resistance appropriate to this class is used in the static calculations of the house structure.
For wooden structures, it is important to protect them against moisture. The foundation of the house must have tight horizontal insulation. Appropriate tightness has certified sealing membranes with high tightness (Sd value must be ≥1,500 m). Construction of a prefabricated house wall with a wooden structure

The prefabricated wall is a multi-layer partition. It consists of such elements (viewed from inside the house):

• plasterboard panels, in which there are visible places for mounting electrical installation boxes;
• OSB or MFP boards (they should not contain formaldehyde);

• vapor barrier film;
• mineral wool placed inside the wooden frame (the insulation material must fill it tightly);
• KVH wood constructions;
• waterproof OSB / 3 or MFP;
• foamed polystyrene boards;
• reinforcing mesh on adhesive;
• external plaster.

The external walls of prefabricated houses have over 30 cm of thermal insulation, which consists of mineral wool filling the spaces of the wooden frame and foamed polystyrene boards. It is best when the external heat insulation is made of large-format polystyrene. As a result, the number of connections that can lead to thermal bridges is reduced by half.
However, the plastering mass must be adapted to wooden construction. Therefore, it must be characterized by: high elasticity and extensibility of the coating, maximum mechanical strength and resistance to the formation of scratches. In addition, the applied plaster must also protect the facade against algae and fungi and the appearance of efflorescence
In the case of prefabricated wooden houses with a higher standard of energy efficiency, instead of the commonly used polyurethane foam, expanding tapes are used to install windows and doors. These elements efficiently insulate and provide better moisture resistance than mounting foam.

https://www.youtube.com/watch?v=k5YSlVWkfYc

Modular Home - Under Construction Tour