Gaia Dome Solutions

MODULAR
DOME HOUSES

Interior of Wanda's dome house.

CONTENTS:

The shape of the dome results directly from nature. Inside such a structure, energy flows freely, which directly affects the well-being of everyone who stays in it. Its inhabitants experience peace, feel connected to nature, which creates an atmosphere conducive to communication, joy and a sense of wholeness.

The roots of the idea of domed houses date back to prehistoric times, their form referring to the functioning of primitive cultures. Flowers, shells, bird nests or shelters of other animals often take a spherical form. When building domes, we draw inspiration from nature.

A circle is a geometric figure with a maximum area and minimum perimeter. Similarly, in three-dimensional space, the sphere has the best volume-to-area ratio. Using this relationship, we created the DOMIR dome - a self-supporting spherical structure based on a circle projection. As a result, we received a building with a maximum area and cubic capacity with a minimum share of external partitions. This solution significantly reduces the cost of construction and significantly reduces heat loss in winter, and prevents overheating of the interior in summer.

The dome is a geometric form in which energy flows in a natural balance and has a positive effect on its inhabitants. This is due to the use of the principles of biogeometry - the science of energy quality, e.g. in the context of shape, solid and its impact on our lives.

WANDA

100m2

duplex house,
ready to fit
everything you dream about.

We designed the building with special care to expose the geometry of the dome inside. We have created a clear day zone, night zone and auxiliary rooms. We designed the building as a two-story building to clearly separate individual zones. As a result, we obtained a functional interior, providing residents with maximum comfort.

We located the main communication in the center to minimize its surface and ensure access to all rooms arranged radially. On the ground floor we located a spacious, partly two-story living room with a large glazing leading to the adjacent terrace. We have separated a kitchenette with a pantry in it. The other rooms on the first floor are two rooms, two bathrooms (including one accessible from the main bedroom) and a vestibule with a utility room. In it, depending on the selected heat source, you can place a boiler room.

PARAMETERS
BASIC

127.5m2

Surface
total

100m2

Surface
buildings

40m

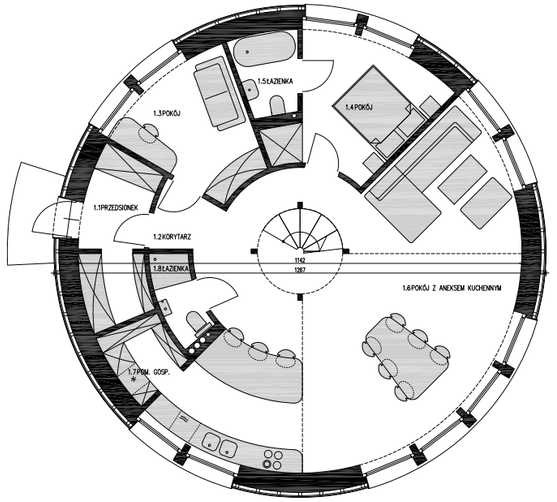
Circuit

11.2m

Diameter

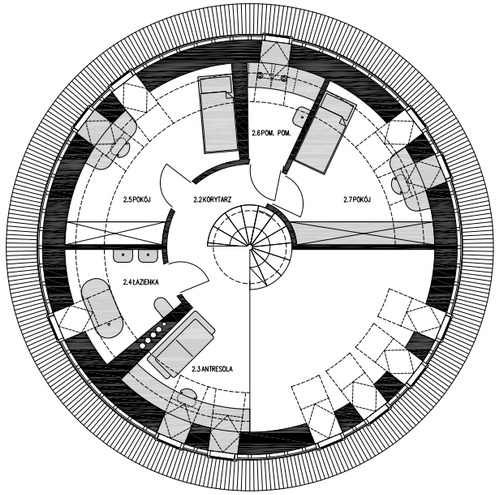
7.21m

Height



Ground floor

Floor



On the first floor, we designed a mezzanine open to the living room, which is an excellent work or leisure space, two bedrooms, a bathroom and a laundry room.

The interior is illuminated with balcony windows on the ground floor, roof windows on the first floor and a centrally located skylight. This one provides sunlight throughout the day and allows you to observe the starry sky at night. Illumination of the interior with natural light significantly increases the quality of life of residents, improves the comfort of using the building and reduces electricity consumption for lighting.

The advantage of a dome-shaped house is great flexibility in arranging space
- we can practically freely modify all rooms, decide on their layout and function, place partition walls, windows, doors or any installations. We can design the final program strictly according to your needs.

Interior of Wanda's dome house.

MULLEIN

Compact space dedicated to lovers of minimalism.

The built-up area of the designed house does not exceed 35 m², so in certain cases we can build it in the form of notification of construction works. This distinguishes it from larger facilities, for which we need a building permit. We designed the house as a single-storey house, but thanks to the well-thought-out function planning, despite the small volume, we managed to create a comfortable mezzanine. The daily zone is illuminated by a large number of windows, each of the rooms on the ground floor has access to daylight. The mezzanine was illuminated with a roof skylight located centrally, at the highest point of the dome. External partitions are self-supporting, so only our imagination limits us when shaping the interior.

PARAMETERS
BASIC

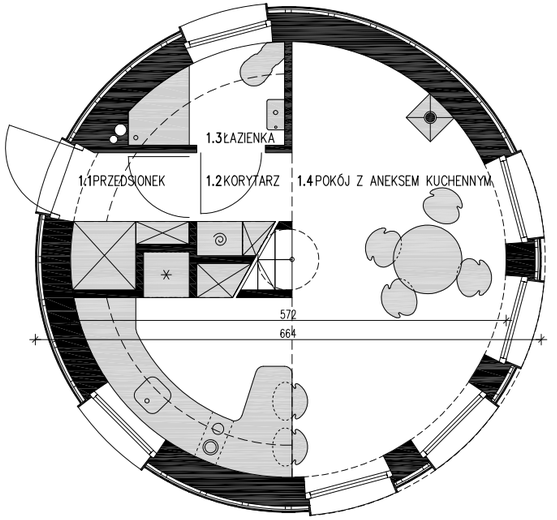
45m2
Surface total

35m2
Surface buildings

35m
Circuit

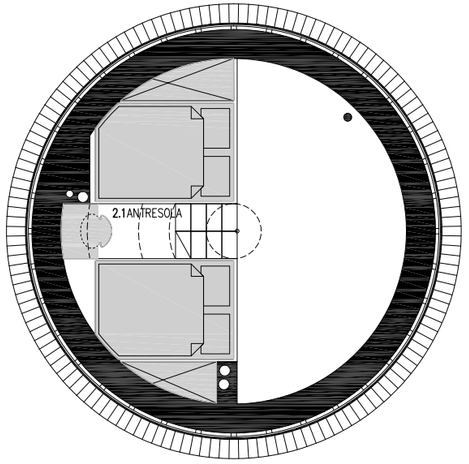
6.7m
Diameter

4.62m
Height



Ground floor

Mezzanine



We designed the building as a year-round building with a full utility program - the first room is a vestibule with wardrobes for outer clothing, protecting us from temperature changes. Next we go to the corridor, from which we have access to a comfortable bathroom and a spacious living room with a kitchenette. The living area is full height, and the semicircular shape and a large number of windows create a very spacious and bright space. Above the kitchen area, corridor and bathroom, we designed a comfortable mezzanine with two double beds and a work area.

Interior of the Dome House of Dziewanna.

TECHNOLOGY
NATURAL

Our houses are based on the best of nature. For their construction, we use eco-
solutions that are naturally environmentally friendly.

The technique of building domed houses is a symbiosis of nature and technology. We take the best from both, so that the final effect is refined in every detail and meets the needs of our customers.

omes are made of modules with a C24 dried wood frame filled with hemp concrete. All elements that make up our houses are made in a specialized plant, and the adopted prefabrication technology is a guarantee of accuracy and short construction time. The assembly of individual modules in the form of a dome takes place directly on the construction site.

The wooden frame of the module is filled with hempcrete DOMIR hemp concrete (from the words "hemp" - hemp and "concrete" - concrete), i.e. a lightweight composite of lime, water and hemp shive - parts of the stems left after separating the fibers. It is a natural, healthy, sustainable, high-quality building material that has the potential to revolutionize natural construction. Hempcrete has a negative carbon footprint because hemp absorbs more carbon dioxide during growth.

The house can be built at any time of the year.

towards carbon than is generated in the production of the finished building material. In addition, over the years, this material hardens by binding CO2 from the atmosphere, thanks to the content of lime transforming into calcium carbonate, i.e. limestone.

As a plaster for the interior of the dome, we recommend clay plaster due to the numerous health-promoting properties of clay, as well as diffusion resistance harmonizing with hemp concrete. Such walls can be painted with natural paints of any available color. Another proposed solution is the use of lime plaster or an internal wooden board.

Such selection of raw materials is dictated by care for the natural environment. We use natural raw materials with a negative carbon footprint, sourced locally, from renewable resources.

HEMP CONCRETE
(HEMPCRETE)

Natural, healthy building material.

Good thermal insulator.

Non-flammable.

Resistant to development fungi and mold.

With low resistance diffuse and high proper heat.

Hemp concrete is primarily an insulating material. It is characterized by the thermal conductivity coefficient λ = 0.066 W/(m*K). DOMIR modules are 40 cm thick, thanks to which it is possible to meet the thermal requirements applicable from 2021 (U ≤ 0.20 W/m²K) without using additional thermal insulation.

The lime-hemp composite, thanks to the cellulose content, is characterized by high specific heat with a relatively large mass. As a result, we have obtained a material with an accumulation capacity much greater than that of mineral wool products. Thanks to this, we have eliminated one of the biggest problems of frame construction - low thermal capacity of partitions. The temperature of the walls changes much slower, thanks to which we maintain a stable temperature inside both in winter and summer.

The lime contained in hemp concrete is an antiseptic material, has a high pH and is inherently antibacterial and antifungal. The lime coating around each piece of hemp in the mix creates a surface that is resistant to mold growth, even when humidity and temperature conditions could cause fungal growth on other insulating materials.

The internal structure of the composite is also an excellent acoustic insulation, significantly improving the comfort of using the building - it protects against the penetration of noise from the outside and constitutes a sound barrier between individual rooms of the interior.

Hempcrete is characterized by a diffusion resistance coefficient m ≤ 0.5 PN-EN 12086:2013. Such high vapor permeability enabled us to construct a diffusion-open partition, i.e. allowing moisture contained in the air in the form of water vapor to penetrate through the partition in a controlled manner. We colloquially call this wall breathing. This construction prevents the partition from getting wet, and thus prevents the biological corrosion of its elements and protects against the development of mold, which is dangerous for the residents.

Hemp concrete is a safe material, it protects the wooden structure of the modules from fire. Subjected to continuous ignition of fire, it shows slight changes in overburning and has been classified as a non-flammable material - reaction to fire B-s1, d0 acc. PN-EN 13501-1:2019-02

The lime-hemp composite is a natural, ecological material, fully recyclable after use. Compared to other construction products, we need much less energy for the production of hemp concrete, which is why it is a low-processed material. We obtain the raw materials necessary for production locally from renewable resources.

MODULES

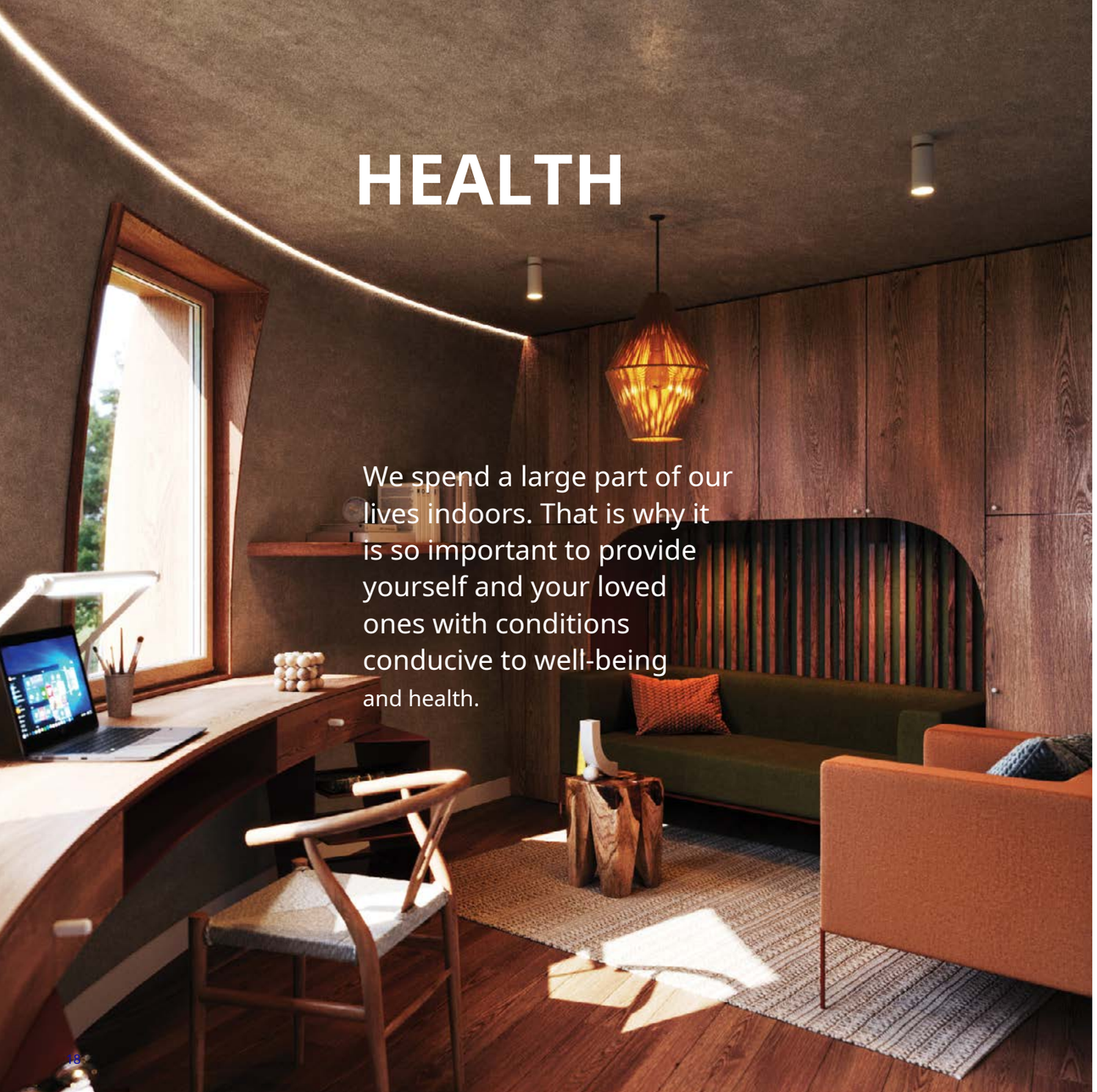
WITH EXAMPLES OF ROOFING LAYERS AND INTERNAL PLASTER

LAYERS OF DOME BUILDING STATE DEVELOPMENT CLOSED

1. Facade / roof tiles / Aspen shingles
2. Battens / formwork
3. Air Void / Wooden substructure
4. Wind insulation
5. Modular wooden construction of Domir
6. Wood/straw wool, gr. 5cm
7. Hempcrete Domir gr. 40cm
8. Plastering expedition

LAYERS OF MODULES FOR SELF ASSEMBLY

- C24 wood construction set
- Module filling: hempcrete/wood wool
- Steel module mounts



HEALTH

We spend a large part of our lives indoors. That is why it is so important to provide yourself and your loved ones with conditions conducive to well-being and health.

The climate in the rooms is shaped by the following physical properties:

- air temperature
- the temperature of the surfaces limiting the interior
- air movements
- air humidity
- dust and gas pollution

Creating a favorable climate inside the building provides us with hemp shives and lime binder, hemp concrete from which modules are made. Its basic parameters are high thermal and acoustic insulation, heat capacity and vapor permeability. These properties make the buildings, whose walls are filled with hemp concrete, a healthy and comfortable microclimate, highly friendly to residents. At the same time, the presence of lime in the composition of the hemp composite provides protection against the development of biological corrosion, thus guaranteeing cleanliness and hygiene of the residence. This is confirmed with full conviction by prof. Tom Wooley, Professor of Architecture at Queens University in Belfast, Northern Ireland, independent expert on ecological building technologies,

Hemp concrete is a 100% natural and ecological material. Unlike synthetic materials, it does not contain any harmful chemicals. It is completely friendly to health and the environment, also after demolition of the house - it can be crushed and used, for example, as fertilizer.

Hemp composite is a vapor-permeable material, which means it allows moisture to flow through. This is of great importance both for the construction of the building and for the health of its inhabitants. Water vapor permeability and self-drying of the walls are possible thanks to the porous network of channels in the mortar. This property protects against long-term dampness of the walls, prevents biological corrosion and has a very positive effect on the microclimate in the building, limiting the growth of mold.

Humidity is one of the most important air parameters, next to its temperature and purity. High relative air humidity has a positive effect on a pleasant indoor climate, which directly translates into good health and well-being.

By maintaining the proper level of humidity inside the house:

- the content of fine dust particles is reduced
- the viability of bacteria and viruses is reduced
- unpleasant odors are reduced
- we prevent electrostatic charging of some items
- the defenses of the skin and the whole organism against pathogenic microbes are activated
- respiratory, circulatory and digestive systems work properly

For these reasons, in order to enjoy good health and well-being, we should maintain the optimum humidity in rooms at approx. 50% (at least 40% and not more than 70%).

One of the ingredients of hemp concrete is strongly alkaline lime, which has a bactericidal effect. This prevents the formation of mold and fungus on the walls of the building. A positive consequence of this action is the protection of the surface covered with it against progressing biological corrosion. This affects the durability of the entire building and, above all, improves the indoor air quality.

The form of the dome together with the use of natural materials free of "building chemicals" creates favorable conditions for living in health and harmony.

KEY *QUESTIONS:*

01 Do modular homes require permits or notifications?

Modular buildings differ from traditional buildings only in the manufacturing technology. They are therefore subject to the same provisions of the construction law and technical conditions to be met by buildings and their location, so all formalities related to construction, including a building permit, are necessary.

02 What are the construction costs in tech-modular nologies?

The cost is similar to traditional methods, however, thanks to prefabrication, the construction time is shortened, which can reduce the total price.

03

04 Who prepares the project?

Our project team prepares the technical documentation, but we are open to cooperation.

05 Can You Build This For Us

Yes, we make houses to the developer's standard, understood as follows: the selection of materials and the degree of finishing of the building is strictly agreed with the client.

- foundations or foundation plate
- roof
- skylight
- heating and ventilation chimney
- ceiling, partition walls
- internal clay plaster
- apartment door
- windows and window sills (internal and external)
- floor screed
- installations: ventilation, water and sewage, heating and electricity (including sockets)
- stairs with balustrades

06 What is needed for self-assembly of a modular house?

With the purchase, you receive an assembly manual in which the process of assembling the modules in a dome house is presented step by step. The main assembly devices are the HDS lift or crane.

ARCHITECTURAL:

07 Architectural design individual

DOMIR prepares individual designs of prefabricated modular houses. In the first stage, a conceptual design is being prepared.

To start working on an individual project, the Investor provides us with:

- a map in the scale of 1:500 or 1:1000 covering the investor's plot, the road from which it will be serviced, and the nearest neighborhood (e.g. basic map) - electronic version (e.g. scan)
- photos of the plot and the surrounding area
- local spatial development plan, in the absence of a local plan - information on the development conditions issued for the surrounding buildings
- completed questionnaire specifying the needs and visions of the Investor (information such as the area of the building, layout and size of rooms, preferred heating and ventilation system, land development, garage, parking spaces, etc. and material solutions)
- reference objects and inspirations in the form of links or photos of buildings, rooms, small architecture, gardens or other forms of land development

08 Architectural design conceptual

On this basis, we hold a meeting (teleconference is also possible). The investor receives a dedicated architect to cooperate with. Having a complete set of information, we prepare building concepts, taking into account solutions in accordance with the above information. The concept includes: the functional layout of the building (a projection with dimensions) - with an indication of individual rooms, their functions, area, etc., visualization of the building from the side of the facade, drawing the building into the plot plan, maintaining access roads, front, back, etc. At this stage, it is possible to Of course, comments on the concept.

Feel free to contact us

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Example Architectural Design