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Fabnoh Gabion Box

Fabnoh Gabion Box Factory supplies gabion products to solve problems in areas of water management and road construction. We also provide advice on the use of our products.

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Design of Gabion Structures - Gabion Box, Gabion Mattress

Initial data for the design

1. Input data for the design of gabion structures shall contain the information needed to:

- Analysis of the slope of the natural and artificial slopes, embankments, direction of channel processes;
- The possibility of determining the forces acting on the structure;
- Develop constructive solutions to the projected facilities;
- Calculations of the basic parameters of structures;
- Development of technologies of construction and further exploitation.

2. Design of gabion structures is based on the results of previously conducted geotechnical and hydrological investigations.

3. Depending on the complexity of the natural environment for the design of gabion structures, the following materials:

- Climatic characteristics of the area;
- Geomorphology and topography;
- Hydrological conditions;
- Soil and drainage studies;
- On local and imported from other regions of the building materials.

Basic requirements of the design of gabion structures

1. Basic requirements for the design of gabion structures for various purposes, and their individual structures and foundations, as well as the main calculation of the load and must be taken in accordance with statutory requirements presented in this standard, In the design and construction should take into account the peculiarity of gabion structures - permeable honeycomb type structure with a flexible three-dimensional mesh cage.

2. The location, layout and type of gabion structures should be chosen according to their functional purpose, the natural conditions of the area of construction works and the requirements of this standard.

3. The design on the water bodies, and variable levels of underwater parts of the gabion structures shall not occur following negative processes:

- For water bodies (lakes, ponds, flooded quarries, reservoirs) - erosion of the bottom of the base structure by the action of the reflected waves;
- For waterways (rivers, streams, canals) - reconfiguration of the channel due to a change of direction of flow of water.

4. Gabion structures used in the construction of river and marine hydraulic structures, used in any climatic conditions at the design average flow velocity of water up to 5.5 m / s and wave loads, determined by calculation.

5. When calculating the stability of natural slopes should be evaluated as the overall stability of the slope, and the local stability of the individual parts of the slope.

6. In the calculations, gabion structures shall be taken into account the following features:

- Porosity of gabions for manual installation of stone material 0.25-0.35;
- The volume of filling the upper gabion stone material should be increased to 5% above the estimated volume, taking into account the possibility of partial self-packing material filling during construction under the influence of vertical loads.

7. The average size of the stone material and height of the gabions to protect slopes from erosion of the coast, in the absence of wind waves is taken depending on the speed of water flow in accordance with the requirements, shown in the following Table.

type of gabion	Gabion height (m)	The average stone size	Limiting the flow rate (m/s)
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		(mm)	
mattress	0.15-0.17	85	3.5
		110	4.2
	0.23-0.25	85	3.6
		120	4.5
	0.30	100	4.2
		125	5.0
Gabion box	0.5-1.0	150	5.8
		190	6.4

8. In terms of wave loads the average size (weight) of rock material and height of the gabion determined by calculation. At the stage of study on the average size (weight) of rock material is determined by the maximum wave height, laying the slope and shall meet the requirements shown in following Table.

Height of mattress- gabion (m)	The average stone size (mm)	Laying the slope of the foundation		
		1:1.5	1:2.0	1:3.0
The maximum wave height (m)				
0.15-0.17	85	0.4	0.75	1.2
0.23-0.25	120	0.6	0.9	1.4
0.3	150	0.7	1.2	1.8
0.5	250	0.9	1.4	2.0

9. The height of gabion structures exceed 0.5-1.0 m estimated water level of the water body in the flood period, taking into account wind and ship waves.

10. The size of the cell gabion mesh products selected in accordance with the average size of the stone.

11. Diameter of wire mesh is chosen based on calculations of stress perceived by the facility.

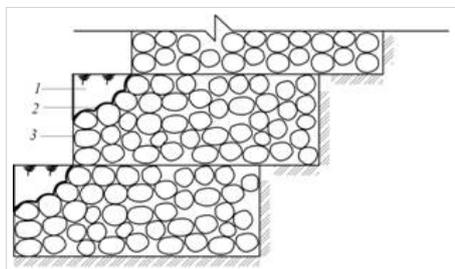
12. At the construction site of gabion structures, gabion structures between a connecting galvanized wire knitting, wire with a flow rate for binding gabion 5% of the total weight of wire containers.

13. The design of gabion structures is allowed to change the shape and dimensions of gabion mesh products, they must also be provided with the strength and stiffness of joints for.

14. The design of gabion structures with geotextiles, in the calculation of the coefficient of friction decreases in the contact zone of the wall with a ground base and backfill of 5-10%.

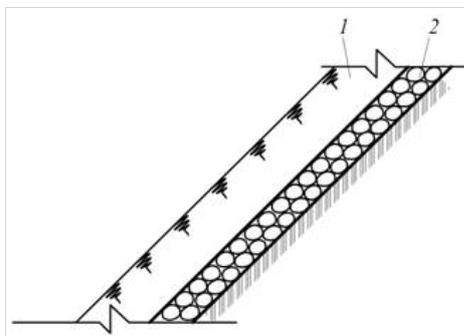
15. To gabion structures used in the design of structures of high degree of responsibility, it is necessary to use solid stone materials of igneous rocks (basalt, granite, diabase, diorite), as well as metamorphic rocks, the characteristics of strength and frost resistance is not lower than in igneous rocks.

16. To ensure the protection of the above-water zone of bioengineering gabion structures with stepped front face, allowed a partial filling of the upper part of the carrier is not box-box-like gabions or gabions with reinforcing panels 20cm layer of topsoil, Figure 1. Gabion structures, made with the use of mattress products recommended to close the 20cm layer of topsoil, Figure 2.



1 – vegetable soil; 2 – geotextile; 3 – stone material

Figure 1 - Example of gabion box-like structures topsoil



1 – vegetable soil; 2 – gabion mattress design

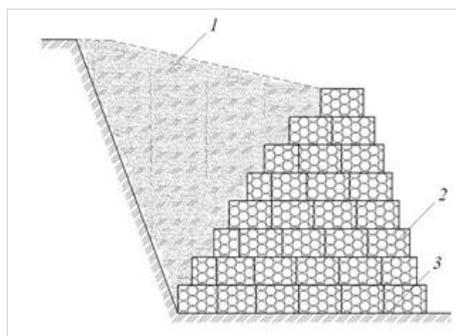
Figure 2 - Example of closing the mattress, gabion structures topsoil

According to the location in space gabion walls are divided into vertical and inclined, in the form of the front faces are divided into smooth and graded.

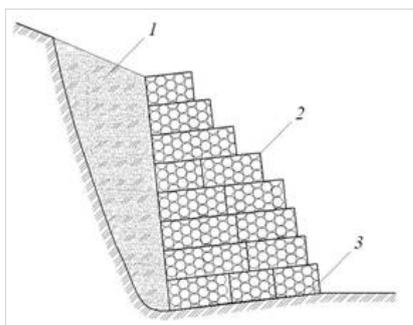
Thin gabion walls of various forms of the front face, it is recommended to design, applying the box-shaped gabion mesh products with a reinforcing plate. Renounce the use of reinforcing bar must be justified project.

The height of the walls to ensure the stability of the upper part of the protected slope or slope. The width and shape

of gabion walls set a condition for external and internal stability of the walls.

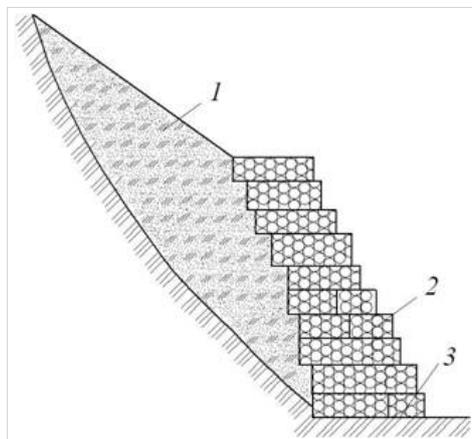


1 - Backfill 2 - gabion box-shaped, 3 - ground facilities
Figure 3 - Example of the construction of massive bulk wall with stepped front edge on a horizontal basis with backfilling

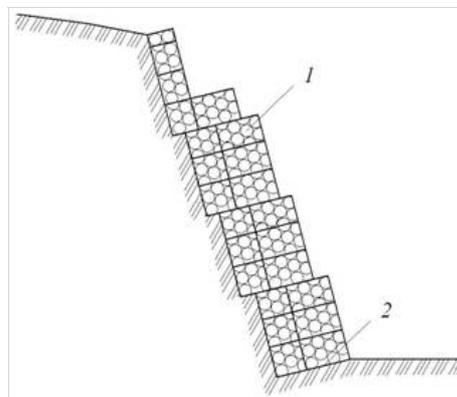


1 - Backfill 2 - gabion box-shaped, 3 - ground facilities
Figure 4 - Example of the construction of massive bulk wall with stepped front edge on the inclined base with backfilling

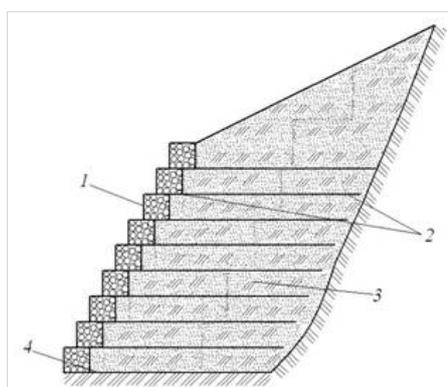
The type, shape, design dimensions, including materials gabion walls should be chosen in the design process, taking into account local conditions, the planned loads and possible deformations of the walls.



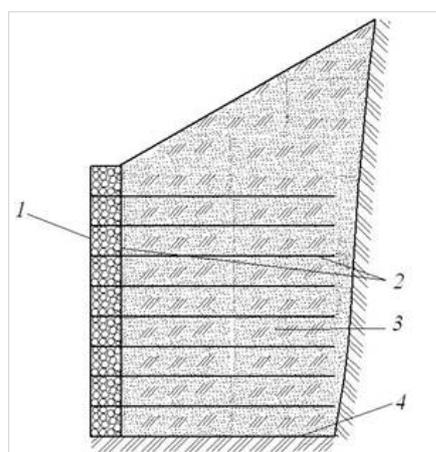
1 - Backfill 2 - gabion box-shaped, 3 - ground facilities
Figure 5 - Example of design walls with stepped front edge on a horizontal basis with backfilling



1 - box-shaped gabion 2 - ground facilities
Figure 6 - Example of design walls with stepped front edge on the inclined base with backfilling



1 - stage front face of building, 2 - gabion box-shaped with a reinforcing plate 3 - Backfill, 4 - ground facilities
Figure 7 - Example of thin-wall construction with stepped front edge of the horizontal base with reinforced backfilling



1 - smooth front face of building, 2 - gabion box-shaped with a reinforcing plate 3 - Backfill, 4 - ground facilities
Figure 8 - Example of thin-wall construction with a smooth front face of the horizontal base with reinforced backfilling

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