

MINIMUM REQUIREMENTS FOR THE INSTALLATION AND USE OF CONCRETE PRODUCTS

1. UAB Betono Mozaika concrete products are a typical product, but their selection and installation in the pavement require specific knowledge, skills and tools. In order for the concrete products to maintain the performance declared by us, as the manufacturer, and to be suitable to be used for their intended purpose for the entire warranty period, the selection of concrete products and the performance of pavement installation work should be done by a specialised company (-ies)/professionals in this field who are familiar with the Minimum Requirements for the Installation and Use of Concrete Products (the "Minimum Requirements for the Installation of Concrete Products" part of the document) and product-specific requirements for the installation of products (if such special requirements are provided for the products purchased by the buyer) published on the [www.betonomozaika.lt website](http://www.betonomozaika.lt).

STORAGE AND TRANSPORTATION

2. For the packaging of concrete products, the manufacturer uses a packaging system that ensures the least possible scratching of the surface of the products during transportation and loading of the product packages. However, scratches on the surface of the products are possible during transportation and loading, and the manufacturer accepts no liability for these scratches if they are no more than 0.5 mm deep (scratches on the surface of the product are not considered product defects if the depth of the scratches is no more than 0.5 mm, *see item 8.1 of the warranty conditions*).
3. We suggest avoiding additional reloading and transportation of the products, as this may result in product breakage or greater than normal scratching of the surface.
4. Concrete products can be transported by all modes of transport, ensuring safe transportation of the products. Products must be stored securely in packages or in stacks, in accordance with occupational safety rules.
5. After delivery, we recommend using the products for pavement installation immediately. During prolonged storage of the products, it is likely that lime stains will appear or increase on the surface of the products.

MINIMUM REQUIREMENTS FOR THE INSTALLATION OF

CONCRETE PRODUCTS DESIGN OF THE PAVEMENT AS A STRUCTURE

6. If the legislation of the country where the concrete products are being laid in the pavement stipulates that a structure design is required in the relevant case of pavement installation using the concrete products, said is mandatory.
7. Pavement installation work and its supervision should be performed by a legal entity capable of performing construction work, or by a natural person qualified as a civil engineer.

PAVEMENT STRUCTURE

Bases

8. Unbound mineral mixtures or bound mixtures are used to install the layers of the pavement structure. The bound layer of the pavement structure must be water-permeable. UAB Betono Mozaika does not provide a warranty/does not guarantee conformity with declared performance for concrete products laid in a pavement where impermeable bound construction material mixtures (bedding and joint filling mortar) were used for installing the bedding and/or joint filling (*see item 11.5 of the warranty conditions*).
9. The declared performance of concrete products laid in a pavement is influenced by the deformation moduli of the pavement support layers. The size of the deformation modulus depends not only on the properties of the base that the pavement structure layers are installed on, but also on the materials of the pavement structure layers, the future pavement structure class, and the design characteristics of the pavement as a structure. For this reason, the size of the deformation modulus must be selected in accordance with the pavement structure design and installation requirements of the country where the concrete products are being laid in the pavement.
10. Concrete products, as a surface finishing material, are an integral part of the pavement structure. As for the features of the pavement structure, it is necessary to know that:
 101. the strength/stability of the pavement is 90% determined by the bases (their installation), and only 10% by the concrete product itself (the declared performance of the product), as a surface finishing material. For example, if the pavement structure is too weak due to unsuitable bases, it will form depressions and ruts, and when using such pavement, not only will the vehicles driving on it be damaged, but the pavement surface finishing material itself will be damaged as well (cracks will appear on the surface of the concrete products laid in the pavement and parts of the product might even break off);
 102. if the pavement structure has a lower water permeability coefficient than is required in the country where the concrete products are laid, the surface of the pavement installed from the concrete products will begin to crack and break off in winter due to the weather.

Concrete paving edgings (kerbs)

11. The purpose of concrete paving edgings is to ensure the fixation of the concrete products in the pavement. Their proper installation limits the displacement of the concrete products laid in the pavement, which can lead to damage to those products.
12. On the installed base, concrete classified as C 12/15 or higher is laid in the kerb locations. The concrete base is installed by laying concrete in two layers, ramming or vibrating each layer separately. The edgings are laid on the compacted concrete base before it has started to set. To ensure stability, a support at least 10 cm thick must be installed at the back of the product. The recommended width of the area where it is not paved above the support is at least 15 cm.
13. Fluctuations in the ambient temperature and the impact of operating loads affect movement of the edgings. In order to avoid cracking on the edges of the concrete edgings, they should not be installed side by side, i.e. they should be installed with 3-5 mm gaps. These gaps are left unfilled or, as needed, may be filled with elastic material.

Concrete water gutters

14. On the installed base, concrete classified as C 12/15 or higher is laid in the gutter locations. The recommended concrete thickness is 15-20 cm. Before laying, the concrete base is compacted. The gutters are laid on the concrete base before it has started to set. During laying, joints are formed which should be between 8 mm and 12 mm wide. The joints are filled with bound fine-grained filling. Deformation joints are installed at least every 12 metres, and a bituminous sealant for external work is used to fill these joints.

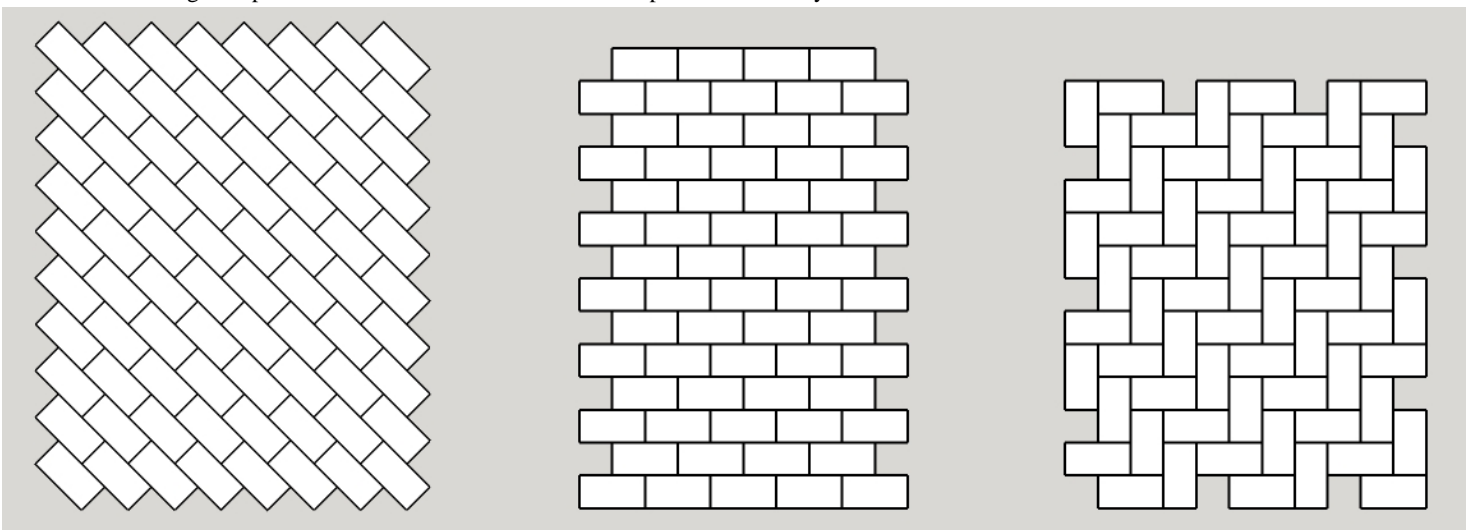
Concrete columns

15. On the installed base, concrete classified as C 12/15 or higher is laid in the column locations. The recommended concrete thickness is 10-15 cm. Before laying, the concrete base is compacted. The columns are placed on the concrete base before it has started to set. Once a row of columns has been formed, supports are installed on both sides. The support is installed from a layer of concrete at least 10 cm thick and 10 cm

wide. Once the concrete has hardened, laying a plant layer is possible on both sides of the column. In case steps are being installed, we recommend raising the height of the support to the bedding of that step.

Concrete paving (blocks and slabs)

16. The bedding is installed on the support layer of the installed base. Due to the possible deviations in the thickness of concrete paving products provided for in legislation, we recommend compacting the bedding together with the laid concrete products. This allows you to ensure the evenness of the concrete surface.
17. When installing the bedding, its thickness should be selected to be approximately 1 cm higher (depending on the bedding material) than the final thickness planned for the structure. The thickness and material for the bedding are selected:
 171. the thickness of the compacted bedding should be between 3 cm and 5 cm. Certified bedding material that is suitable to be used for its intended purpose must be used for the bedding, for example, 0/4, 0/5 or 0/8 unbound mineral mixtures;
 172. if the compacted thickness of the bedding is more than 4 cm and the product thickness is ≥ 120 mm, certified bedding material that is suitable to be used for its intended purpose must be used for the bedding, for example, 0/11 unbound mineral mixture. A mixture of another fraction may also be used which meets the requirements of the country where the concrete products are being laid for composition and quality according to the intended use.
18. The products are laid by moving forward from the paved area to prevent climbing on the levelled pavement bedding. Cuts at the edges of the pavement can be avoided by properly selecting the distances between the concrete paving edgings. A string line can be used to ensure the straightness of the row of products. If there are no plans to install concrete paving edgings, then a concrete support must be used to confine the paved area and keep the blocks from shifting towards the edge.
19. When installing a pavement, it is important to ensure its stability. Failure to do so will cause product displacements that may result in the products cracking or parts of the product breaking off. The stability of the pavement is affected not only by the concrete paving edgings installed, but also by the shape of the products and the paving pattern selected.
20. Improper pavement loads are one of the causes of damage to the surfaces of the concrete products that are laid in the pavement. Therefore, it is extremely important to carefully plan and calculate future pavement loads.
21. Laying is done according to the paving pattern selected. When choosing the paving pattern, how the pavement will be used must be taken into account:
 211. in the places of the pavement where no motorised traffic is planned, there are no restrictions on the choice of product shape and paving pattern;
 212. in the places of the pavement where passenger vehicle/temporary auxiliary transport movement is planned, rectangular products (*such as products with codes: GT2-6, GTB2-6, GT2-7, GT2-8, GT2-10 set, GT19-6B*) cannot be laid with the long edge of the product parallel to the direction of the traffic. For laying rectangular products, a paving pattern that provides sufficient resistance to torsion (tilting) should be used, so we recommend choosing a 45° stretcher bond, stretcher bond or herringbone paving pattern (*see pictures below*);
 213. in the places of the pavement where heavy vehicle movement and special loads are planned, interlocking paver blocks (*such as products with codes: GT12-8, GT12-10, GTM24-8*) or a paving pattern that provides high resistance to torsion (tilt) must be used. Herringbone is the recommended block paving pattern;
 214. a pattern laid diagonally to the direction of traffic allows better load transfer from one product to another than a transverse pattern. The herringbone pattern ensures the best load transfer and pavement stability.



45° stretcher bond paving pattern

Stretcher bond paving pattern

Herringbone paving pattern

22. When laying concrete products, joints must be formed between them. When laying products without joints, the edges of products begin to crack due to the load.
23. The protrusions (compensators) on the edges of the products are not designed to ensure the correct dimension of the joint width. Since the purpose of the joint is to transfer the load acting on the product to another product placed next to it, the width of that joint must be chosen according to the type and thickness of the product:
 231. for blocks and slabs < 120 mm thick, the width of the joint should be between 3 mm and 5 mm;
 232. for blocks ≥ 120 mm thick, the width of the joint should be between 5 mm and 8 mm;
 233. for slabs ≥ 120 mm thick, the width of the joint should be between 5 mm and 10 mm.
24. The joints are filled with mineral filler to the top of the product and swept down. Incomplete filling of the joints does not ensure the stability of the pavement, so the edges of the product may crack. Unbound mineral mixtures which meet the composition and quality requirements of the country where the concrete products are being laid are suitable for filling the joints.

25. Depending on the width of the joint formed, mineral mixtures with the following fractions may be used: 0/2, 0/4, 0/5, 0/8. Water permeable joint materials can also be used, which not only prevent the growth of weeds, but also increase the stability of the pavement. The installation of such joints should be carried out in accordance with the instructions of the manufacturer of the joint material.
26. The area laid with concrete products is vibrated with a vibratory plate, which during the process protects the products from getting scratched or cracking, or parts of the product breaking off. Vibration begins from the edge of the pavement, moving towards the middle, but only after ensuring that the concrete pavement is completely clean and dry. This must be ensured, as solids that get under the vibratory plate during vibration will scratch the surface being vibrated and may break off part of the surface of the concrete product.
27. Please note that before using any vibratory plate, the manufacturer or seller should be consulted with on the suitability of the respective vibratory plate to be used in the specific case for vibrating the area laid with concrete products.
28. If the manufacturer or seller of the vibratory plate says that conventional and/or vibratory plates with polyurethane rollers can be used, we recommend giving preference to vibratory plates with polyurethane rollers. This type of roller is superior to conventional vibratory plates because: i) they protect the concrete product from damage better during compaction, ii) they do not dislodge the products being vibrated, iii) they tend to cause less damage to the edges of the concrete product. We highly recommend the use of vibratory plates with polyurethane rollers for products without bevels and for slabs. Please note that the manufacturer or seller of the vibratory plate must be contacted to determine if it is suitable for use in the specific case.
29. Areas where the joints are not filled or are not completely filled cannot be vibrated because the stability of the pavement will not be ensured, so the edges of the concrete products may crack.
30. Differences in pavement height cannot simply be smoothed out with a vibratory plate by vibrating concrete products through force, as this may also result in parts of the product breaking off.
31. After vibration, the joints between the products are refilled with mineral filler and the pavement thus prepared is immediately ready for use.

MINIMUM REQUIREMENTS FOR THE USE OF CONCRETE PRODUCTS

32. The longevity of concrete products as a surface finishing material is affected not only by the stability and strength of the installed pavement base, but also by the future usage conditions of the pavement. If the user of the concrete products does not ensure proper usage conditions, the manufacturer cannot guarantee conformity of the product with its declared performance.
33. When using pavement made of concrete products, it is necessary to:
 331. ensure safe use of the concrete products. For this reason, activities that damage the structure of the product are prohibited during use (*for example*, driving vehicles with metal tracks, using the pavement with higher loads than provided for in the design, storing sharp-edged objects on the pavement, storing objects by placing them on the pavement by impact). Failure to follow these instructions may result in mechanical damage to the product structure (larger-than-normal scratches on the product surface, as well as possible product breakage). The manufacturer cannot guarantee conformity of such products (damaged) with the declared performance;
 332. ensure the proper filling of joints between the concrete products with joint material. Incomplete filling of the joints does not ensure the stability of the pavement, so the edges of the product may break. The manufacturer cannot guarantee conformity of such products (damaged) with the declared performance;
 333. regularly remove dirt that collects on the surface of the pavement made of concrete products. Solid dirt that gets under the external load during use can damage the structure of the product – it may scratch the product more than usual, break it, or otherwise mechanically damage the product. The manufacturer cannot guarantee conformity of such products (damaged) with the declared performance. In addition, since concrete products are absorbent, dirt that gets on the surface of the pavement can become mechanically lodged or absorbed into the products and leave visible stains on their surface. For this reason, the products may remain stained, especially if the dirt is not removed from the pavement for a long time. To prevent dirt lodged to the surface from leaving stains or to minimise the intensity of the stains, we recommend using impregnators (please contact UAB Betono Mozaika sales offices for impregnators and how to use them) or choosing TCP technology products (*see the TCP Technology Product Description*).
 334. Only certified products meant for cleaning concrete pavement may be used for cleaning pavement made of concrete products, in accordance with manufacturer instructions. When removing dirt or snow from the pavement, it is important not to damage the surface of the concrete products laid in the pavement.
34. Rust stains may appear due to contaminants on the pavement or other substances containing iron that get on the pavement during use, e.g. soil saturated with iron oxide (in which water will transfer the iron oxide to the pavement surface), water running onto the pavement from metal elements, weed killers and insecticides containing iron sulphates, etc. When killing weeds or spraying insecticides on the lawn, we recommend not doing so in areas near the pavement or on a windy day, since the wind will disperse the product containing ferrous sulphates in the air, and the risk of this product getting on the pavement will be high even if it is not used near the pavement. Removing rust stains from a concrete pavement is difficult, and often impossible. There are products on the market for removing these stains, but they are often made on a hydrochloric acid basis and usually have only a minimal effect. Stronger concentrations of acid cleaners can even darken existing rust stains, so before cleaning the entire area, we recommend testing the cleaning agent on one product and evaluating the result (please note that UAB Betono Mozaika is not responsible for cleaning agent tests carried out with the concrete product, the effectiveness of cleaning agents and/or possible adverse effects on the concrete products).
35. Often in winter, ice forms on the pavement surface. Sand should be used to make the surface of the pavement less slippery. In cases where it is necessary to remove the accumulated ice layer, taking into account the information contained in this item below, only technical ice melt salt may be used, after you have assessed the possible damage to the pavement surface at your own risk. Please be warned that the use of ice melt salt causes concrete corrosion (corrosion is the process of breaking down the concrete structure, which reduces the performance declared by the manufacturer as well as the product's longevity) and product discolouration. According to an independent study conducted by the KTU Building Materials and Structures Research Centre (its description and results can be found on the manufacturer's website, www.betonomozaika.lt, in the "Freeze/thaw resistance study" document in the Consumer information section), when concrete paver blocks are exposed to a salt solution, the surface of the blocks crumbles somewhat. Even though, thanks to the advanced production at UAB Betono Mozaika, the crumbling value of the samples obtained by the study is much lower than the minimum limit tolerated according to the standard for concrete products, we cannot evaluate the intensity of the potential corrosion effects of the salts in a particular case. Therefore, if using ice melt salt on the pavement is unavoidable, we recommend using one that is the least aggressive to concrete, and testing it on part of the pavement first (to make sure you are satisfied with the result).

FINAL PROVISIONS

- 36 Special installation and/or usage requirements may apply to individual product types (e.g. openwork products). These requirements are provided in a separate document, which you can always find at www.betonomozaika.lt in the section Products -> Consumer information. In cases where special installation and/or usage requirements are established for individual product types, the requirements for the installation and use of concrete products set out in this document (Minimum Requirements for the Installation and Use of Concrete Products) only apply to the extent that they do not conflict with the special requirements, i.e. to the extent that the special requirements do not provide otherwise than this document.
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