JONIEC

FENCE CONSTRUCTION

INSTRUCTIONS

OGR/5/2023/EN

GORC® De Luxe GL22 / GL38

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TABLE OF CONTENTS

A. INTRODUCTION	2
B. SYSTEM COMPONENTS	2
C. PRODUCTION TECHNOLOGIES USED	3
D. FENCE CONSTRUCTION VARIANTS	3
E. FOUNDATION CONSTRUCTION	5
F. PREPARING THE GP COMPONENTS FOR FOUNDATION CONSTRUCTION	7
G. BLOCK LAYING	8
H. CONCRETE MIX PREPARATION	9
I. FILLING THE BLOCKS	11
J. CONCRETE MAINTENANCE AFTER FILLING THE BLOCK	11
K. INSTALLATION OF CAPS	12
L. WATERPROOFING	13
M. INSTALLATION OF GATES AND SPANS	14
N. WARRANTY	15

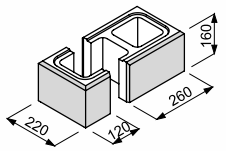
These instructions are for the construction of a fence using double-slot blocks.

A. INTRODUCTION

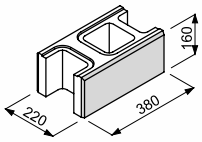
Fences should be constructed in compliance with good building practice and the applicable provisions of the Building Law. The information contained in this guide offers general guidance and recommendations. In the case of specially designed fences, priority should be given to the designer's recommendations and guidelines. The investor and the contractor, who should be suitably qualified and authorised, are responsible for all work. JONIEC® is not responsible for the execution of the fences, but only for its products when marketed in accordance with the current standards.

B. SYSTEM COMPONENTS

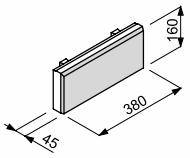
GORC® de Luxe GL22



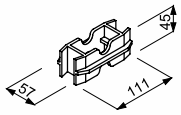
GU+GA
post block
4-sided split



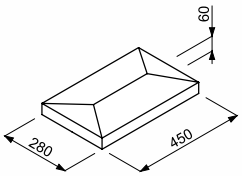
GM
wall block
2-sided split



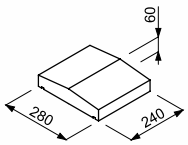
GP
wall block
1-sided split



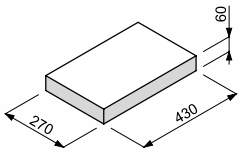
ŁSON
connector



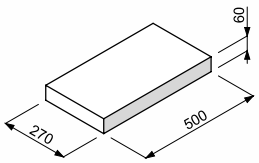
CSBNR
post cap
plain hipped



CBG
wall cap
plain gabled

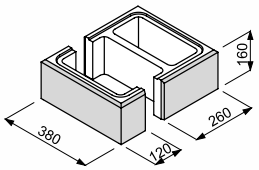


CPGS
post cap
4-sided split

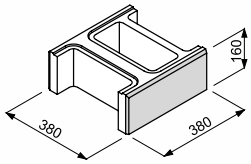


CPGM
wall cap
2-sided split

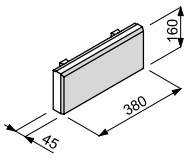
GORC® de Luxe GL38



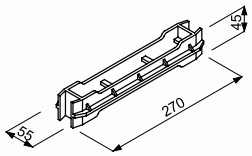
GUD+GAD
post block
4-sided split



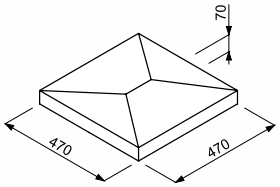
GMD
wall block
2-sided split



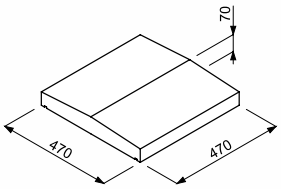
GP
wall block
1-sided split



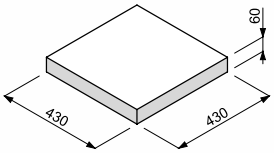
ŁSOD
connector



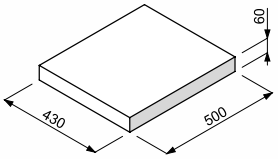
CSDR
post cap
plain hipped



CPDD
wall cap
plain gabled



CPGSD
post cap
4-sided split



CPGMD
wall cap
2-sided split

C. PRODUCTION TECHNOLOGIES USED

VIBRO TECHNOLOGY
thickening of the product structure

SPLITTING TECHNOLOGY
product with a split structure

RESISTANT TO ATMOSPHERIC CONDITIONS

MULTI COLOR®
multicoloured product

DYED IN THE MASS
fully dyed product

CERTIFIED PRODUCT
certified quality

D. FENCE CONSTRUCTION VARIANTS

With GORC® de Luxe blocks, we can build a fence in several ways:

1. Variants: ECO/STONE

variant 1.1 - **ECO STANDARD** (Fig. 1)
Posts are built with GU+GA blocks, 4-sided split, placed on pad footings. Caps can either be CSBNR (plain hipped) or CPGS (4-sided split). Spans of the chosen material are mounted between the posts. This variant is also available for GUD+GAD blocks, with either CSDR (plain hipped) or CPGSD (4-sided split) caps.

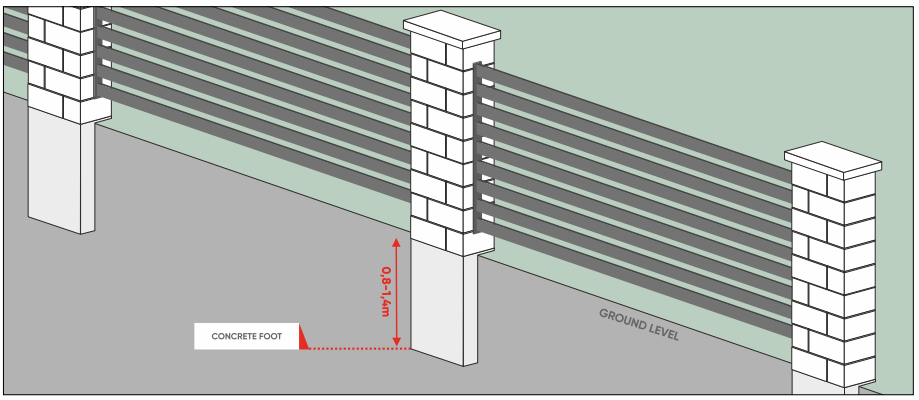


Fig. 1

variant 1.2 - **STONE STANDARD** (Fig. 2)
Posts are built with GU+GA blocks, 4-sided split, placed on pad footings. Caps can either be CSBNR (plain hipped) or CPGS (4-sided split). Foundation consists of split STONE elements mounted between the posts.
Spans of the chosen material are mounted between the posts. This variant is also available for GUD+GAD blocks, with either CSDR (plain hipped) or CPGSD (4-sided split) caps.

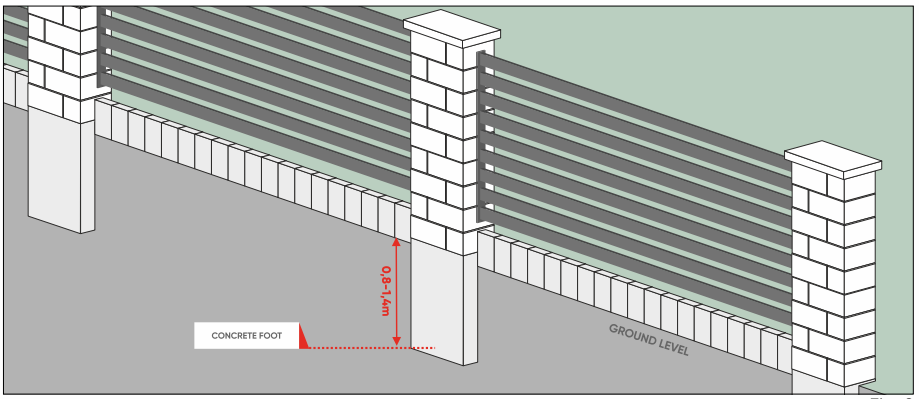


Fig. 2

2. Variants: SUPPORT

variant 2.1 – SUPPORT STANDARD (Fig. 3)

Posts built with GU+GA blocks, 4-sided split, are founded on a strip foundation that runs along the entire length of the fence. Caps can either be CSBNR (plain hipped) or CPGS (4-sided split). Spans of the chosen material are mounted between the posts. This variant is also available for GUD+GAD blocks, with either CSDR (plain hipped) or CPGSD (4-sided split) caps.

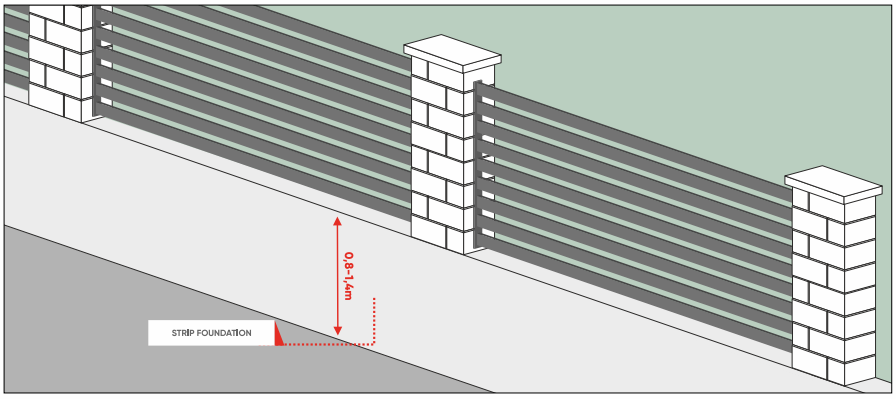


Fig. 3

3. Variants: STANDARD

variant 3.1 – STANDARD I (Fig. 4)

Posts and foundations are built with GORC® de Luxe blocks. The foundation is placed on a strip foundation along the entire length of the fence, using either GM blocks, 2-sided split, or alternating 2xGP blocks, 1-sided split. The ends of the foundation are made of GU or GA blocks, 3-sided split. Caps can either be CBG, plain gabled, or CPGM, 2-sided split. Posts are built with GU+GA blocks, 4-sided split, and laid on the foundation at the planned distances. Caps can either be CSBNR (plain hipped) or CPGS (4-sided split). Spans of the chosen material are mounted between the posts above the foundation.

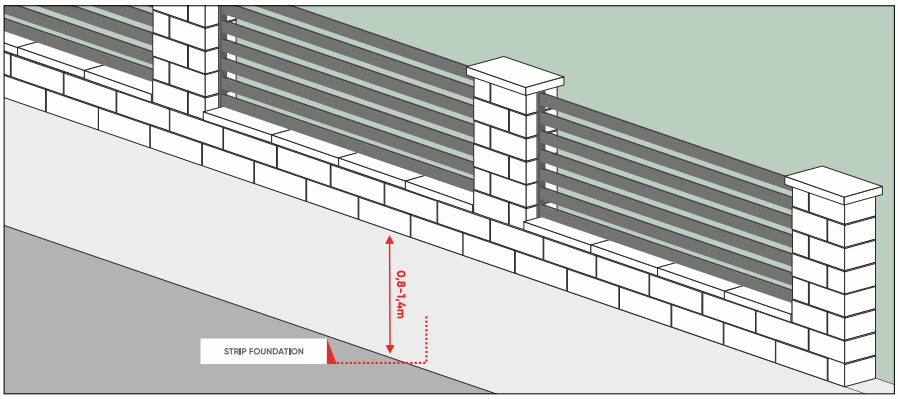


Fig. 4

variant 3.2 – STANDARD II (Fig. 5)

Posts and foundation are built with GORC® de Luxe blocks placed on a strip foundation that runs along the entire length of the fence.
Posts are built with GUD+GAD blocks, 4-sided split, and placed on a strip foundation. Caps can either be CSDR (plain hipped) or CPGSD (4-sided split). The foundation is made of alternating GM blocks, 2-sided split, or 2xGP blocks, 1-sided split, and is built between the posts. Caps can either be CBG, plain gabled, or CPGM, 2-sided split. Spans of the chosen material are mounted between the posts above the foundation.

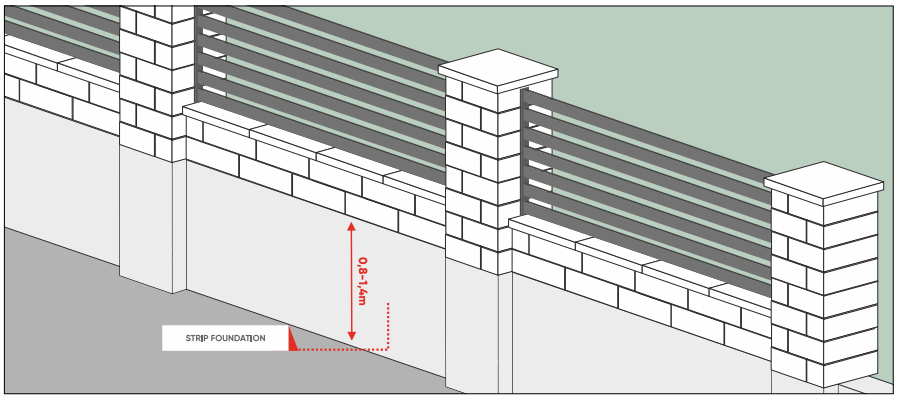


Fig. 5

4. Variants: WALL/BASE

variant 4.1 – WALL STANDARD I (Fig. 6)

Posts and foundation are built with GORC® de Luxe blocks placed on a strip foundation that runs along the entire length of the fence. Posts are built with GUD+GAD blocks, 4-sided split, and placed on a strip foundation. Caps can either be CSDR (plain hipped) or CPGSD (4-sided split). The wall between the posts is built with GM blocks, 2-sided split, or with 2xGP blocks, 1-sided split, laid alternately. Caps can either be CBG, plain gabled, or CPGM, 2-sided split.

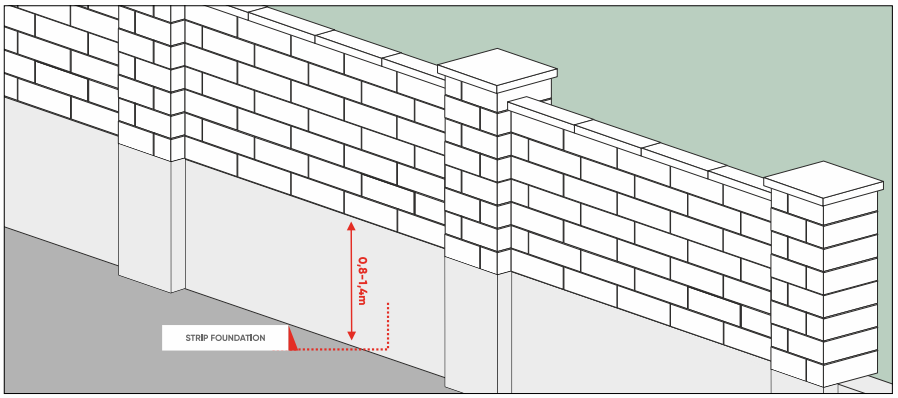


Fig. 5

variant 4.2- **WALL STANDARD II** (Fig. 7
Posts and foundation are built with GORC® de Luxe blocks placed on a strip foundation that runs along the entire length of the fence. The wall is built with GM blocks, 2-sided split, or 2xGP blocks, 1-sided split (laid alternately), and GU or GA blocks, 3-sided split, at the end of the wall.
Caps can either be CBG, plain gabled, or CPGM, 2-sided split.)

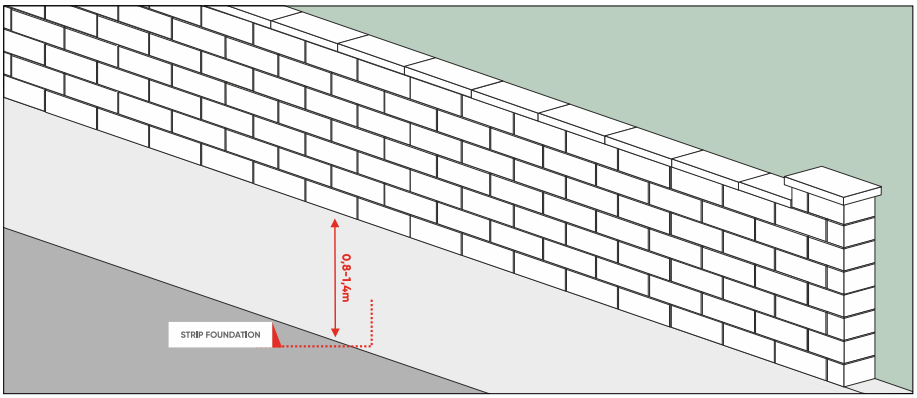


Fig. 7

variant 4.3 - **BASE STANDARD** (Fig. 8)
Foundation is built with GORC® de Luxe blocks placed on a strip foundation that runs along the entire length of the fence. The foundation is built with GM blocks, 2-sided split, or 2xGP blocks, 1-sided split (laid alternately), and GU or GA blocks, 3-sided split, at the end of the foundation.
Caps can either be CBG, plain gabled, or CPGM, 2-sided split. Spans of the chosen material are mounted on the foundation.

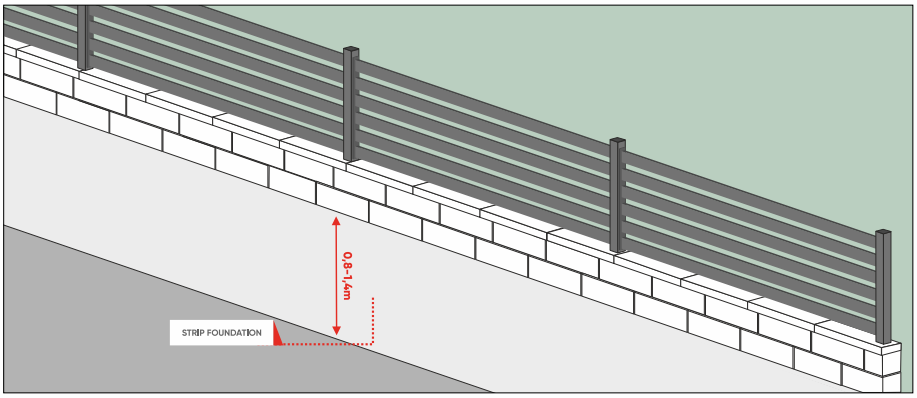


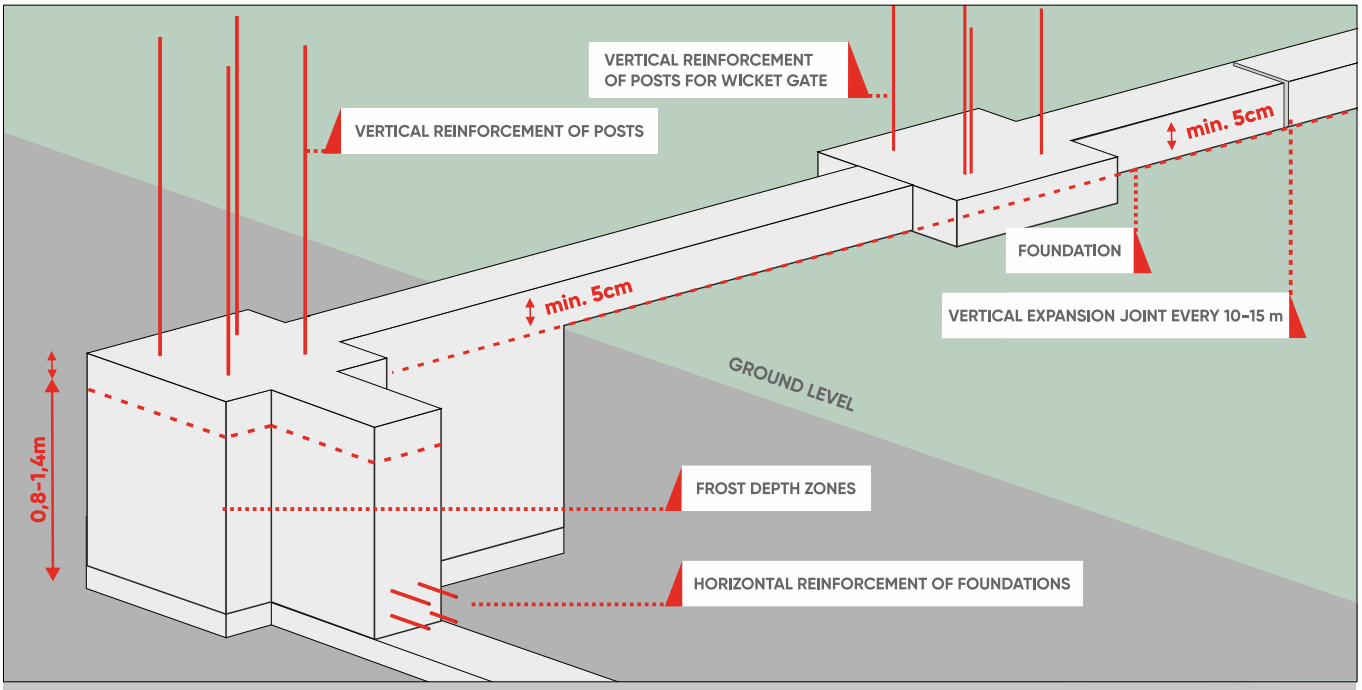
Fig. 8

E. FOUNDATION CONSTRUCTION

Recommendations

1. Construct the strip foundation below the frost depth:

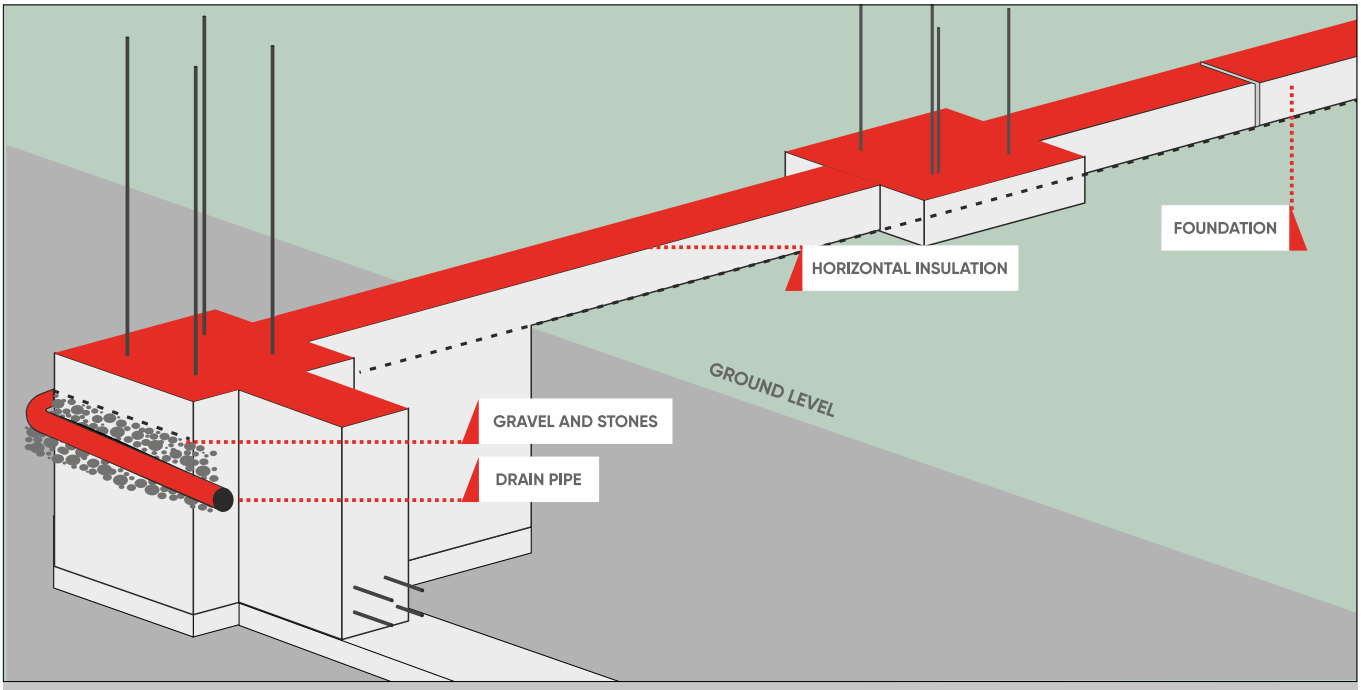
FROST DEPTH ZONES



foundation and reinforcement

Fig. 9

2. Install a vertical expansion joint every 10–15 metres on average in the strip foundation.
3. Place horizontal reinforcement in the strip foundation.
4. Place vertical reinforcement at the planned posts.
5. Spread the strip foundation at least 5 cm above ground level.



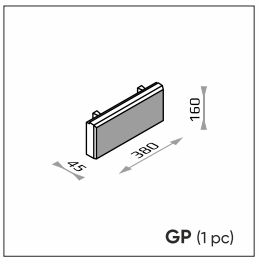
waterproofing

Fig. 10

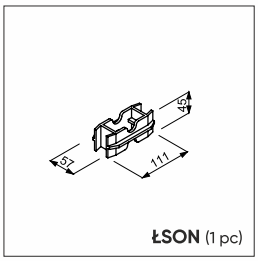
6. Apply horizontal insulation on the foundation (e.g. with IZOHAN foil), which will protect the fence against capillary water transfer from the ground.
7. Carry out drainage along the entire fence.

F. PREPARING THE GP COMPONENTS FOR FOUNDATION CONSTRUCTION

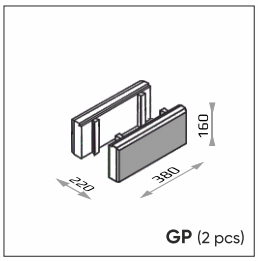
For constructing the foundation in the GORC® de Luxe system, GP elements are utilised. These elements are to be connected using the ŁSON or ŁSOD connector.



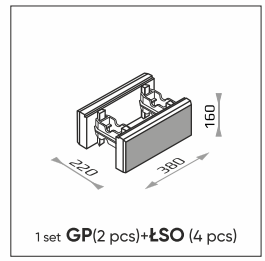
GP (1 pc)



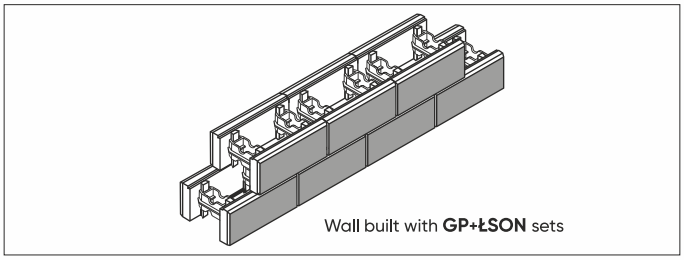
ŁSON (1 pc)

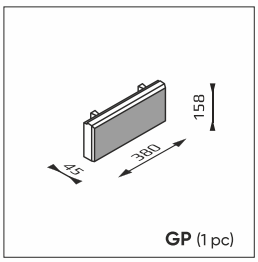


GP (2 pcs)

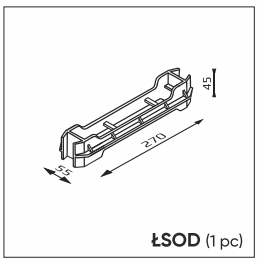


1 set **GP**(2 pcs)+**ŁSO** (4 pcs)

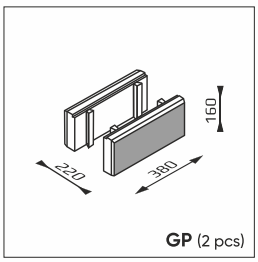

Wall built with **GP+ŁSON** sets



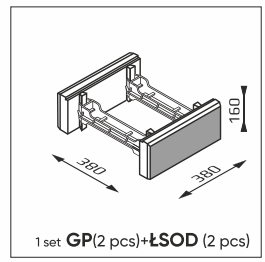
GP (1 pc)



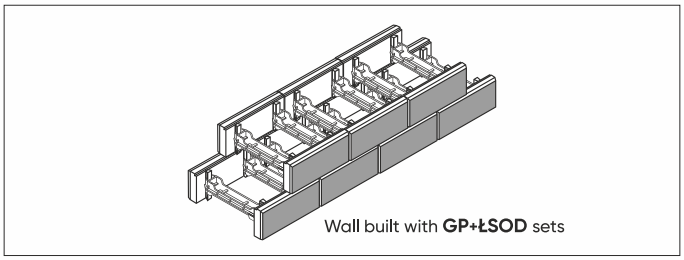
ŁSOD (1 pc)



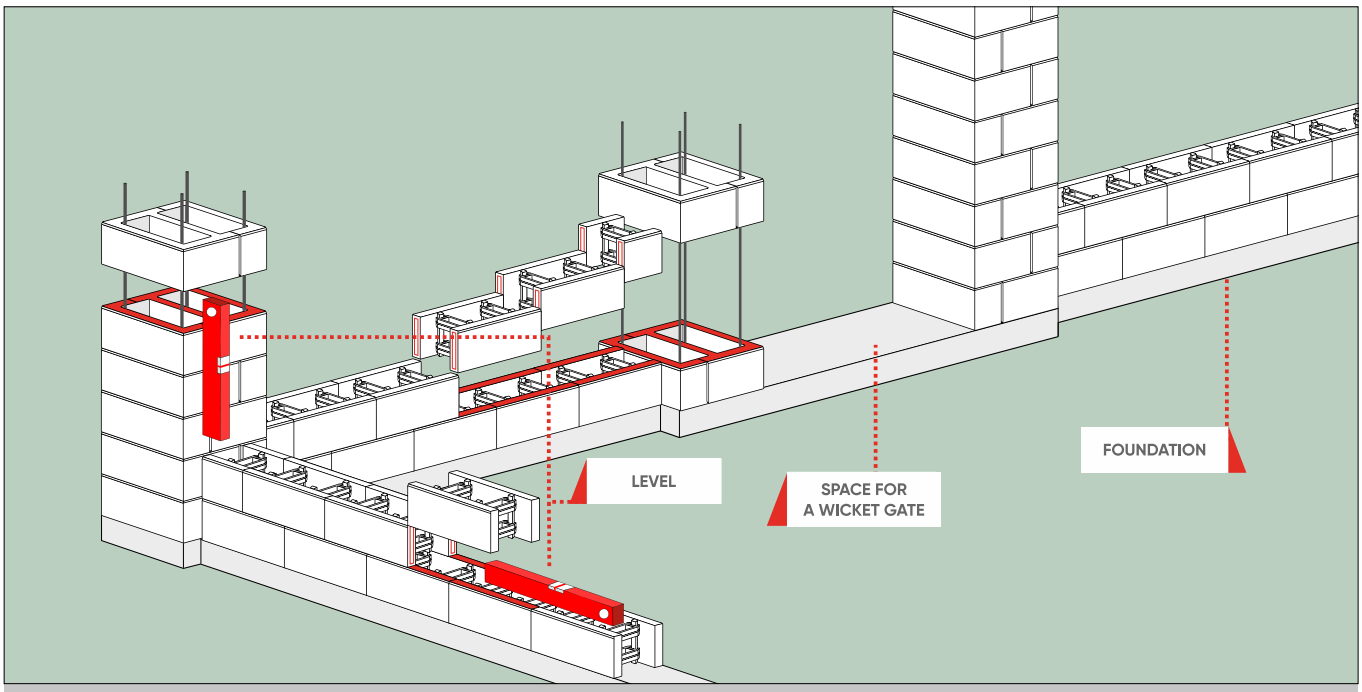
GP (2 pcs)



1 set **GP**(2 pcs)+**ŁSOD** (2 pcs)


Wall built with **GP+ŁSOD** sets

G. BLOCK LAYING



laying and gluing of blocks

Fig.11

Recommendations:

1. Construction and installation work should be carried out at temperatures ranging from +5°C to +25°C.
2. Ensure that the foundation has been properly constructed and the post locations have been accurately planned. Place the first layer of blocks on JONIEC® glue or cement mortar of a grade no lower than M12 (cement mortar should be used only at the joint between the blocks and the foundation).
3. Level the first layer to correct any unevenness in the foundation.
4. Lay the blocks so that they adhere tightly to each other without any vertical or horizontal deviations. Compensate for any deviations in level by sanding or using wedges.
5. Lay successive layers of blocks on JONIEC® glue. Apply the glue to the adjacent side walls of the blocks and to the entire upper edge of each block.
6. If the vertical reinforcement for posts, foundations or walls was not installed at the stage of pouring the strip foundations or pad footings, drill holes in the strip foundation at the appropriate places and install the reinforcement using a chemical anchor.
7. If you are building a fence in direct sunlight, wet the slots of the blocks with water before pouring the concrete mix.
8. If you are building a fence with multicoloured MULTI-COLOR® blocks, pay attention to the different colour distributions in each block. Mix the blocks according to the three-pallet rule and arrange them to create the most aesthetically pleasing design. The best effect is achieved by ensuring there is no saturation of one colour in any particular area.
9. Lay the layers of GORC® de Luxe fencing alternately.

G. CONCRETE MIX PREPARATION

The concrete mix used for filling the blocks should have a plastic consistency (S2-S3 according to EN 206), which is easy to form and compact in the slots of the blocks and sufficiently cohesive to avoid segregation.

Below are recommendations for various methods of preparing the concrete mix for filling the blocks:

1.1 Concrete mix prepared on-site from dry packaged mixes of the appropriate grade.
1.2 Concrete mix prepared on-site from high-quality ingredients.
2. Concrete mix supplied from a concrete production plant.

JONIEC® recommends using variant 1.1, which involves concrete mix prepared on-site from dry packaged mixes.

1.1/CONCRETE MIX PREPARED ON-SITE FROM DRY PACKAGED MIXES

This variant is recommended by JONIEC®.

1. Read the complete documentation (including the technical data sheet, instructions for use, suitability for the intended use and methods of preparation, placing, compaction and care, etc.).
2. The ready-to-use dry mix should be of an appropriate concrete grade, with B25 being recommended.

DO NOT use lower grades of the concrete mix.
DO NOT use the concrete mix, such as "POST MIX 448", with concrete posts, due to their rapid setting time, which can cause excessive stress during the setting period and subsequently damage the blocks and the entire fence.

3. The preparation of the mix should be in accordance with the manufacturer's recommendations. The air temperature during the work should be between **+5°C and +25°C**.
4. In warmer temperatures, moisten the blocks before pouring the mix to prevent water from migrating out of the mix too quickly, causing it to lose its properties.
5. During filling the blocks, thicken the concrete mix in the slots by gently vibrating it with a vibration poker or by hand-rodding, ensuring the mixture fills the slots tightly. Fill the blocks with concrete in stages, with a maximum of three blocks in height per pour.
6. Remove any dirt from the surface of the blocks.

IMPORTANT!
7. The entire prepared mix from the concrete mixer MUST be used within a maximum of 40 minutes (at air temperatures between +5°C and +25°C).
8. **IT IS FORBIDDEN** to add additional water to the previously prepared concrete mix, as this will cause it to lose essential properties such as strength, water absorption and frost resistance.

1.2/CONCRETE MIX PREPARED ON-SITE

STAGE 1

1. Prepare high-quality ingredients: washed sand + washed aggregates + cement + the first portion of water. The bagged cement should be certified with the "Pewny Cement" quality label . Pay attention to the expiry date of the cement and check that it is not lumpy. The cement should be loose and free from lumps; clumped cement is not suitable for use. Aggregates should be free from impurities. Visually inspect the quality of the aggregates; if in doubt, spread a small amount of sand on your hands. If there are traces of impurities, such as clay inclusions, do not use the aggregate as it will not allow you to achieve the required concrete parameters.
2. Mix everything in the concrete mixer according to the following proportions*.

	cement I/II 42.5	water**	sand 0/2	gravel 2/8	LBN	total
kg	25.0 (bag)	11.5	50.8	61.2	0.25	149.0
litres	20.8	11.5	30.8	38.2	0.24	102.0

* as you increase the amount of concrete you prepare, ensure you maintain the correct proportions of all the ingredients.

** the amount of water added depends on the moisture content of the aggregates (sand, grit) and should be continuously monitored while the concrete mix is being prepared. The resulting concrete mix should have a plastic consistency.

STAGE 2

3. Add LBN to the mixed concrete mix according to the proportions on the product label.
4. Mix everything in the concrete mixer until a homogeneous mass without clumps is obtained.

STAGE 3

5. Add the final portion of water and mix until a plastic consistency is formed.

STAGE 4

6. The construction should be carried out at air temperatures between +5°C and +25°C. First, wet the slots of the blocks with water, then pour the prepared mix into the blocks according to the outlined procedure.
7. During filling the blocks, thicken the concrete mix in the slots by gently vibrating it with a vibration poker or by hand-rodding, ensuring the mixture fills the slots tightly. Fill the blocks with concrete in stages, with a maximum of three blocks in height per pour.

STAGE 5

8. Remove any dirt from the surface of the blocks.

IMPORTANT!
1. The entire prepared mix from the concrete mixer MUST be used within a maximum of 40 minutes (at air temperatures between +5°C and +25°C).
2. **IT IS FORBIDDEN** to add additional water to the previously prepared concrete mix, as this will cause it to lose essential properties such as strength, water absorption and frost resistance.

2/ CONCRETE MIX SUPPLIED FROM A CONCRETE PRODUCTION PLANT.

STAGE 1

1. Collect the concrete mix from the concrete production plant along with the concrete specification documents. Visually assess the concrete mix during unloading. Ensure that it is homogeneous, that its consistency corresponds to a plastic consistency and that it shows no signs of segregation. Read the delivery document and, if you have no doubts, confirm receipt of the goods with your signature after unloading. If you have concerns about the quality of the delivered concrete, report them to the driver and note them manually on the self-copying delivery note.

GENERAL GUIDELINES FOR MANAGING CONCRETE FROM THE CONCRETE PRODUCTION PLANT:

Concrete ordered from the concrete production plant	**concrete strength class**	**C30/37**
	concrete exposure class	**XF1**
	water absorption	**up to 5%**
	maximum ratio value	**w/c=0,55**
	minimum cement content	**300 kg/m³**
	maximum aggregate size	**8 mm**
	suggested cement strength class	**42.5** (Portland cement certified with the "Pewny Cement" quality label ")

The document from the concrete production plant should contain the following details:

- **a)** name of the concrete production plant
- **b)** delivery number and order specification (concrete class, exposure class, water absorption)
- **c)** vehicle registration number
- **d)** quantity of mix in m^3
- **e)** declaration of conformity
- **f)** purchaser's details
- **g)** date and time of loading (time of first contact of cement with water)
- **h)** time of delivery and unloading

STAGE 2

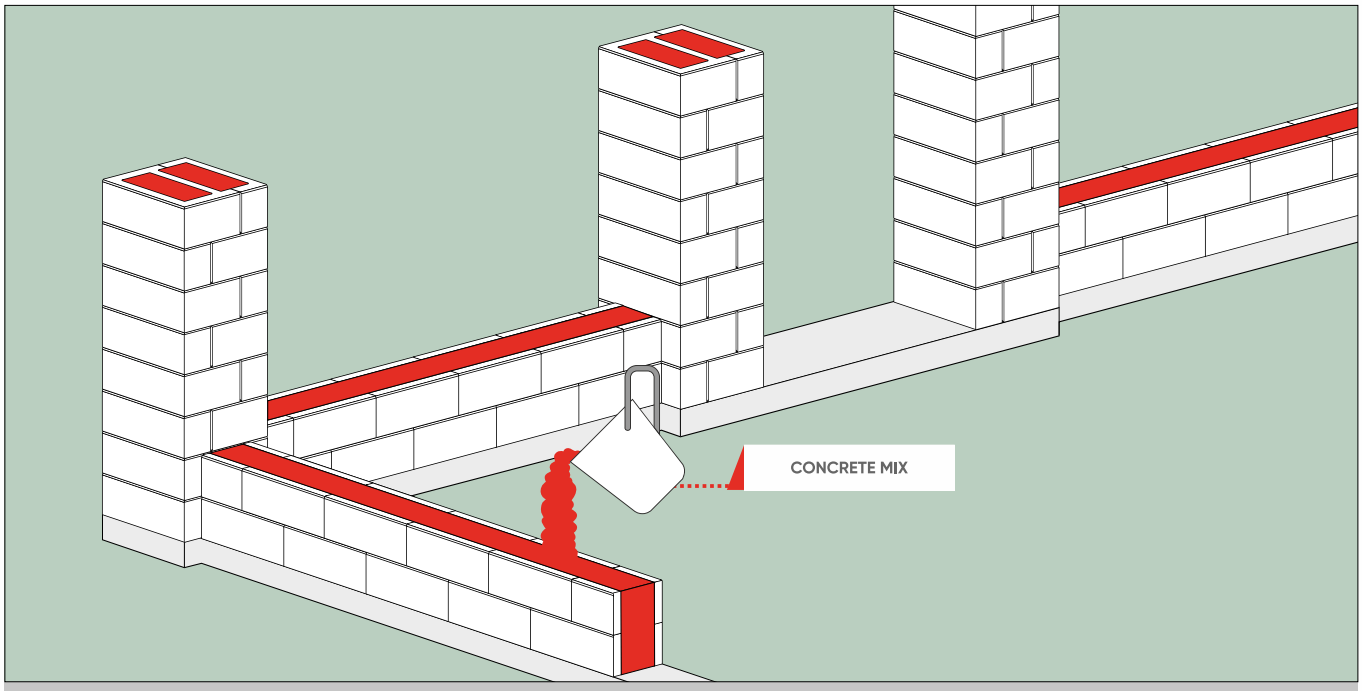
2. The construction should be carried out at air temperatures between **+5°C do +25°C**. First, wet the slots of the blocks with water, then pour the prepared mix, which has been delivered from the concrete production plant, into the blocks.
3. During filling the blocks, thicken the concrete mix in the slots by gently vibrating it with a vibration poker or by hand-rodding, ensuring the mixture fills the slots tightly.

STAGE 3

4. Remove any dirt from the surface of the blocks.

IMPORTANT! 1. The entire prepared mix from the concrete mixer **MUST** be used within a maximum of 40 minutes (at air temperatures between +5°C and +25°C).
2. **IT IS FORBIDDEN** to add additional water to the previously prepared concrete mix, as this will cause it to lose essential properties such as strength, water absorption and frost resistance.

I. FILLING THE BLOCKS



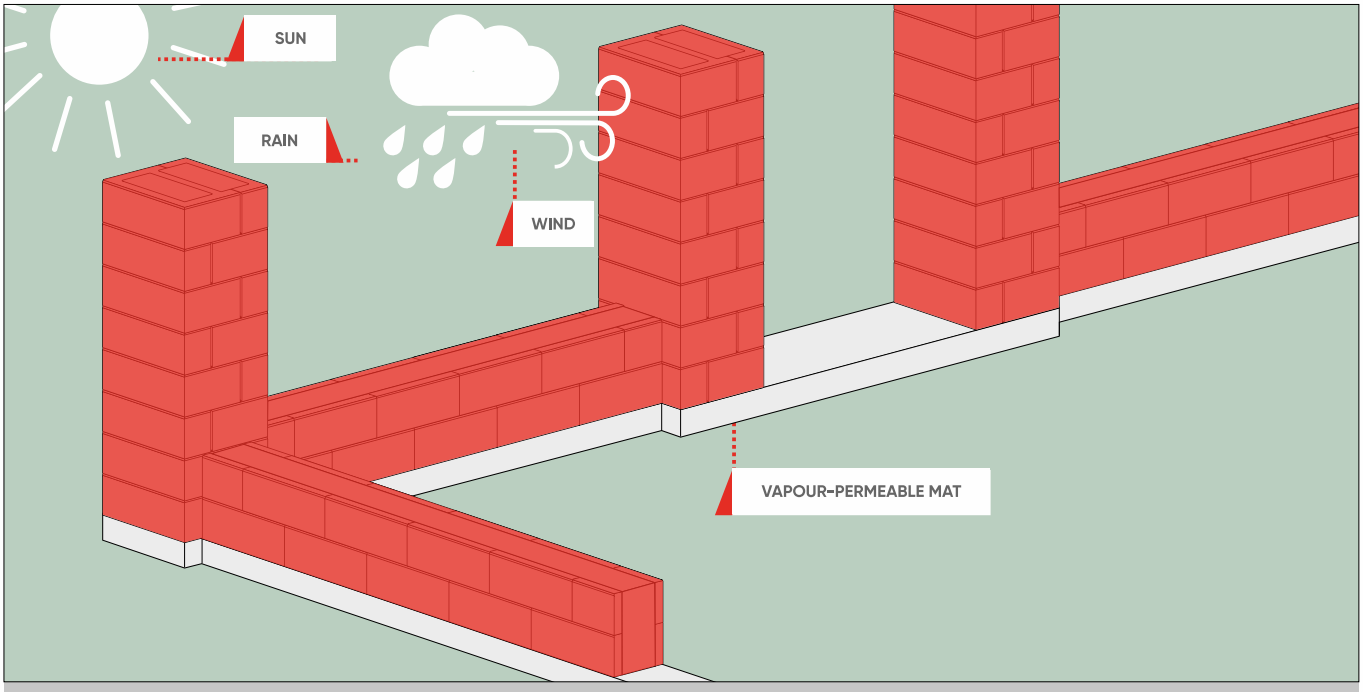
filling the blocks with concrete

Fig.12

IMPORTANT!

1. The concrete mix should be used as soon as possible after preparation or delivery.
2. The composition of the mix **MUST NOT BE** altered, especially by adding water.

J. CONCRETE MAINTENANCE AFTER FILLING THE BLOCKS



concrete maintenance

Fig.13

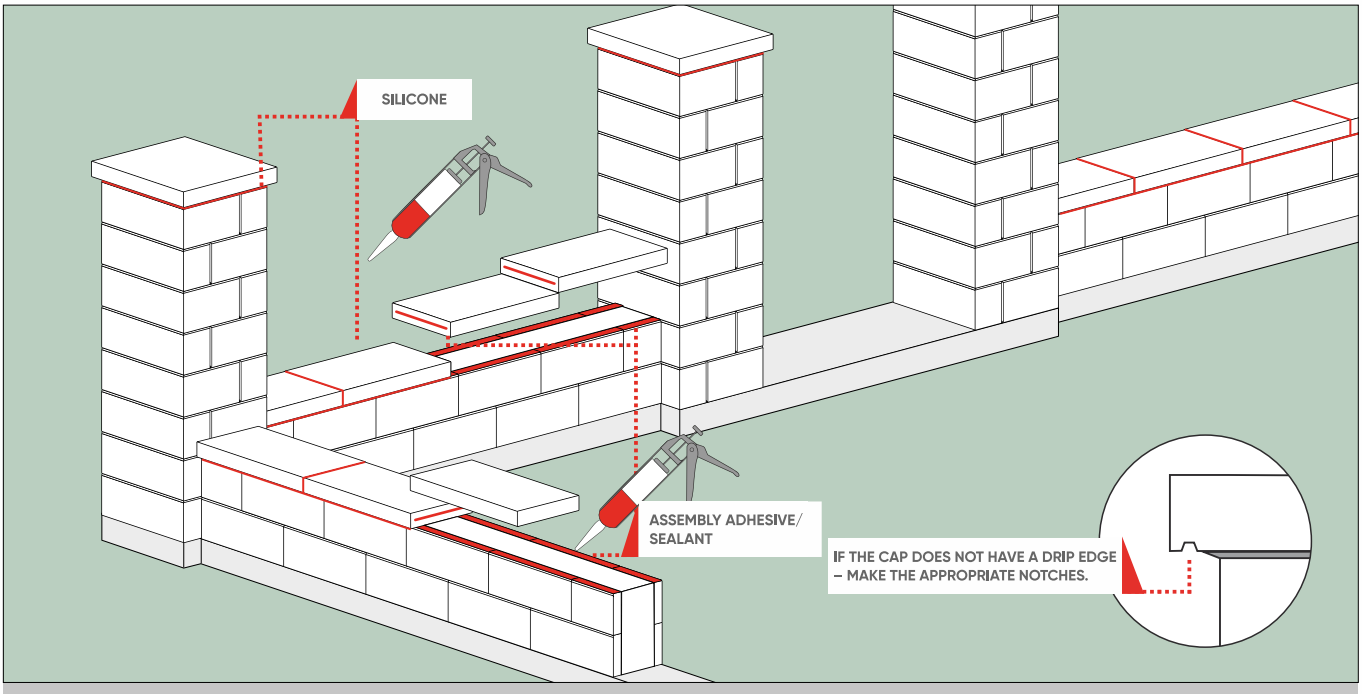
Maintenance is an essential process, but one often overlooked when building a fence. Even the highest quality concrete becomes worthless if its application and subsequent care are not done properly. Freshly poured concrete should always be protected from the damaging effects of wind, extreme temperatures and precipitation. Lack of proper care leads to damage to the structure of fresh concrete, resulting in the loss of the intended concrete properties later in the life of the fence.

The rapid migration of water from the core concrete mix to the exterior of the blocks can cause scratching and cracking as well as plastic shrinkage of the concrete mix used for filling. Maintenance involves a series of actions designed to facilitate the proper setting and hardening of the cement in the concrete. This ensures that the hardened concrete achieves the intended properties, such as resistance to harmful atmospheric and environmental factors.

IMPORTANT!

1. After filling the blocks with the concrete mix it is mandatory to carry out maintenance of fence to eliminate plastic shrinkage, achieve the appropriate concrete strength and protect it from harmful weather effects and freezing. Such maintenance involves controlling the temperature and the level of moisture migration from the concrete core.
2. During periods of higher temperatures, periodically wet the fence structure and use covers such as a vapour-permeable membrane or wet mats.
3. During periods of low temperatures, use covers such as mats, foil, blankets and vapour-permeable membranes to maintain a minimum concrete temperature of +10°C.
4. Continue this maintenance for at least 7 days, until the caps are installed.

K. INSTALLATION OF CAPS



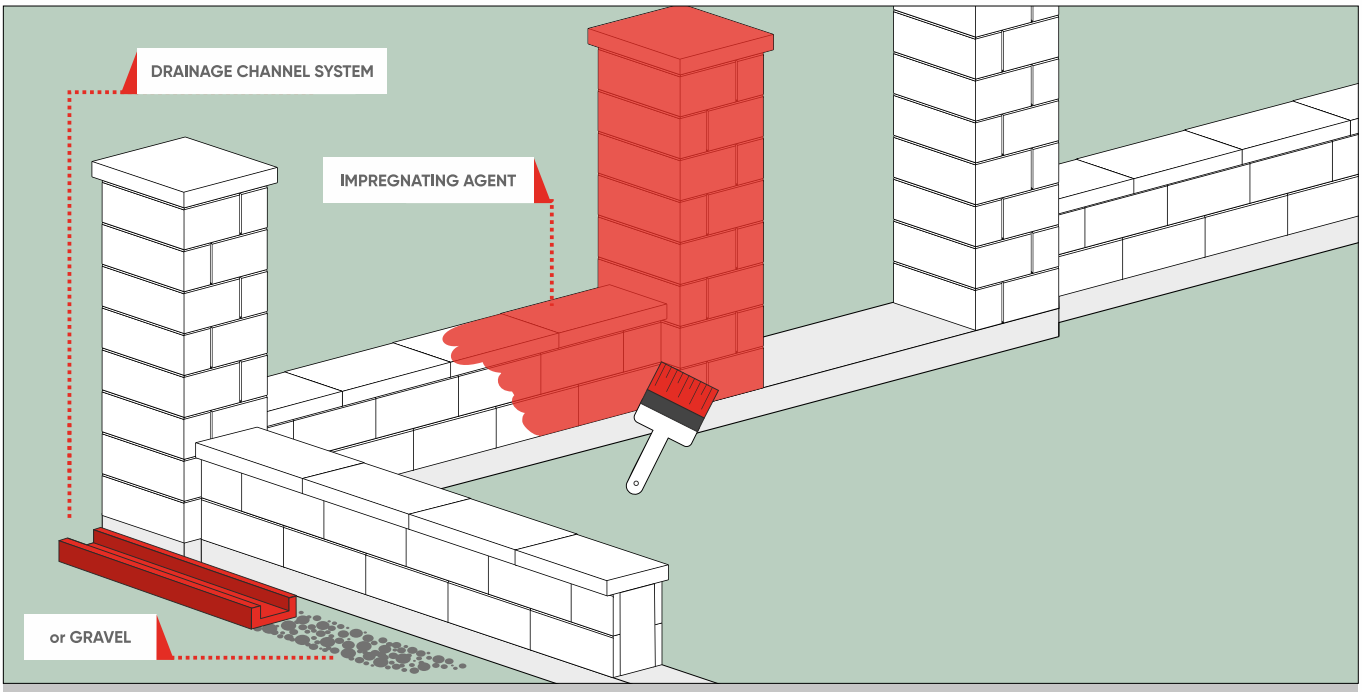
installation of caps

Fig.14

Recommendations:

1. The caps of the GORC® De Luxe system extend beyond the outline of the block.
2. Before installing the cap, sand the block on which the cap is to be placed so that it fits exactly to the edge of the block.
3. In caps without drip edges, make appropriate notches.
4. Place caps on JONIEC® adhesive sealant.
5. Seal the joints and gaps between the caps and between the caps and blocks with silicone sealant to protect the slots of the blocks against water, moisture and air migration.

L. WATERPROOFING



waterproofing

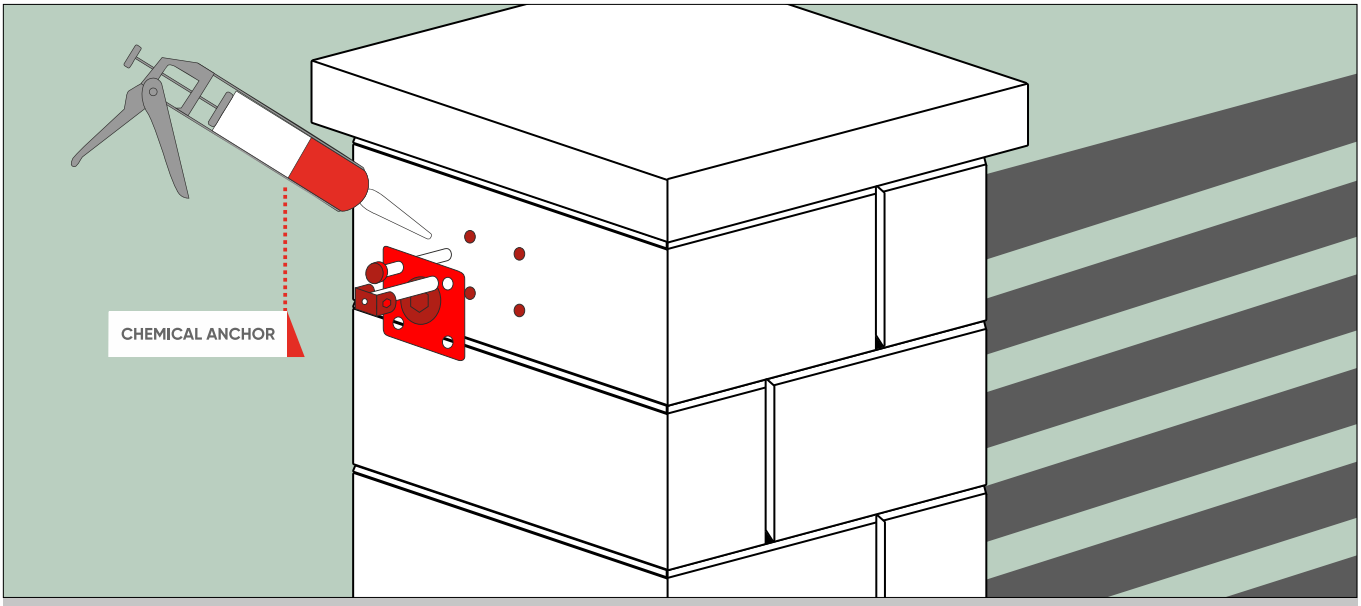
Fig.15

Recommendations:

1. Clean any residual dirt from the surface of the blocks. Apply the cleaning agent only to the dirty areas, following the instructions for use. The manufacturer recommends using JONIEC® efflorescence and tarnish remover.
2. Then, rinse thoroughly with water.
3. Impregnate the fence after all elements have dried completely and in suitable weather conditions. Ensure that the fence elements remain entirely dry during impregnation.
4. To protect the caps from dirt, moss growth or other factors, impregnate them or paint them with a quality concrete paint.
5. To protect the lower surface of the fence from dirt during heavy rain and melting snow, create a drainage channel system along the entire fence line or cover the ground with gravel, small stones, etc. This will significantly reduce mud splashing on the fence.

IMPORTANT!
1. **DO NOT** impregnate prior to 30 days after completing the fence installation work.
2. After applying the JONIEC® efflorescence and tarnish remover, wait at least 5-7 days before impregnation.

M. INSTALLATION OF GATES AND SPANS



installation of wicket gate

Fig. 16

Recommendations:

1. The installation of the spans can take place after the concrete, which has been poured into the fence blocks, has reached full strength, which is no less than 28 days from the moment of pouring.
2. Construct the posts for the installation of gates and wicket gates to bear the weight of the gates and wicket gate as well as the wind load.

IMPORTANT! It is important that the posts to which gates and wickets will be mounted are constructed from blocks with a minimum width of 28 cm. For smaller blocks, it is recommended to mount gates and wicket gates on independent steel posts, in accordance with the manufacturer's recommendations for gates and wicket gates.

3. The locations for anchor installation should be as close as possible to the vertical axis of the posts and the horizontal axis of the blocks.
4. Anchors must not be installed less than 8 cm from the outer edge of the block.
5. Mount spans on chemical anchors that meet the manufacturer's specifications for the spans.
6. Check that the anchoring elements are suitable for installation in the concrete block system (on the market, there are also such anchors that can only be installed in steel posts).
7. After marking the positions for the holes, first drill a hole with a small diameter bit, and then enlarge this hole with the correct bit. This will allow more precise drill holes and help avoid cracking the blocks.
8. Drill the holes perpendicular to the wall of the block, in accordance with the recommendations provided in the table:

INSTALLATION PARAMETERS – a hole in the ground

	diameter (mm)	depth (mm)
M8x110	10	85
M10x130	12	95
M12x160	14	110
M16x190	18	125
M20x260	24	180
M24x300	28	220

Steel parameters according to section 3.1 AT-15-8866/2012

9. After cleaning the holes of dust, introduce the chemical anchor into them, and then, within the appropriate time, insert the steel fittings.
10. Attach the gate and the wicket gate to the steel fittings.
11. When mounting gates and posts on independent steel posts, install them according to the manufacturer's recommendations.

N. WARRANTY

Warranty period: 5 years from the date of purchase.

THE WARRANTY COVERS:

The warranty covers damages and defects attributable to the manufacturer, i.e. manufacturing faults identified upon receipt of the goods.

THE WARRANTY DOES NOT COVER:

The warranty does not cover damages resulting from: improper design or construction of the fence, improper or non-compliant installation of purchased products according to the good building practice, use of inappropriate materials for the installation of products, failure to follow the instructions and recommendations of the Seller regarding the installation, care, insulation, impregnation and protection of products, use of concrete with an incorrect exposure class for filing the fence, poor consistency of the mixture, improper and non-compliant foundation of fences according to the good building practice, improper use, not according to the intended use and properties of the purchased products, improper storage or transport, force majeure, i.e. especially natural disasters and other unpredictable random events.

The warranty does not cover and does not consider as defects those deviations allowed by applicable standards and reference documents: deviations in dimensions and appearance of products, calcium efflorescence in the form of deposits on the surface of products, natural changes in product colouration due to use, possible surface microcracks due to shrinkage associated with the maturing of products, deviations in structure and colours conditioned by the production process of products and the natural variability in the granulation and colour of aggregates and other raw materials, cracks in elements caused by the use of concrete with an inappropriate exposure class or improper execution and care.

The warranty does not cover convex, concave or protruding elements of the external texture of the block. In the case of protrusions at the edges of the block, the contractor should level them using manual tools (chisel and hammer).

UWAGA!

- **THE TIME ELAPSED FROM THE PREPARATION OF THE CONCRETE MIX UNTIL THE BLOCKS ARE FILLED MUST NOT EXCEED 40 MINUTES UNDER NORMAL WEATHER CONDITIONS.**
- **ADDING WATER TO THE CONCRETE MIX AFTER MIXING IS PROHIBITED, AS IT WILL LOSE ITS PROPERTIES SUCH AS STRENGTH, ABSORPTION AND FROST RESISTANCE.**
- **THE CONSISTENCY OF THE CONCRETE MIX MUST BE PLASTIC (S3/S4 ACCORDING TO PN-EN 206).**
- **AFTER FILLING THE BLOCKS WITH THE CONCRETE MIX IT IS MANDATORY TO CARRY OUT MAINTENANCE OF THE FENCE TO ELIMINATE PLASTIC SHRINKAGE, ACHIEVE THE APPROPRIATE CONCRETE STRENGTH AND PROTECT IT FROM HARMFUL WEATHER EFFECTS AND FREEZING. SUCH MAINTENANCE INVOLVES CONTROLLING THE TEMPERATURE AND THE LEVEL OF MOISTURE MIGRATION FROM THE CONCRETE CORE.**

CALCIUM EFFLORESCENCE:

Calcium (carbonate) efflorescence is a natural phenomenon, independent of the manufacturer. It arises from the reaction of calcium hydroxide, which is one of the product of hydration (binding) of cement with carbon dioxide from the atmospheric air. This reaction mechanism involves the transport of calcium hydroxide through the capillary pore system to the surface of the concrete element, where it undergoes carbonatation, forming white deposits. This phenomenon is temporary and, depending on the intensity, gradually fades over time.

SHADES:

It happens that concrete products differ in shades between different production batches, and sometimes even within the same batch. This occurs because our products are made from natural raw materials. As much as possible, we strive to ensure that the colours are consistent; however, minor variations are natural and do not constitute a product defect. Our main goal is to maintain the high quality of our products, which is why we ensure their durability and resistance to the weather.

REMEMBER!!!

WHEN UTILISING DIFFERENT PRODUCTS AND SYSTEMS FROM THE MANUFACTURER (FENCES, PALISADES, FACADES) – THE TEXTURES AND COLOURS OF INDIVIDUAL SYSTEMS DIFFER DUE TO THE USE OF VARIOUS TYPES OF AGGREGATES AND MANUFACTURING TECHNOLOGIES.