

It is highly advisable that you throughly read this document BEFORE you start. ATTENTION! THESE INSTRUCTIONS MUST REMAIN WITH POOL OWNER





TABLE OF CONTENTS

- 1 GETTING STARTED P4
- 2 STRUCTURE ASSEMBLY P14
- 3 STEP UNIT ASSEMBLY P17
- 4 WHITE GOODS P24
- 5 CONCRETE POURING P29
- 6 CONNECTING THE HYDRAULIC SYSTEM P32
- 7 WATERPROOFING & FILTRATION P33
- 8 TIPS & ADVICE P34





You have just acquired a swimming pool kit which is simple and easy to use. When the blocks are filled with concrete, you will obtain a 15cm thick reinforced concrete structure.

Take it step by step, and take your time. Follow carefully the explanations in this manual. After having read through this instruction manual if you have any further questions please contact your dealer.



Number of people required : 2

Assembly time :

- Earthworks : deadline according to soil type 1/2 days to 3 days.
- 2. Preparation and concrete pouring 1 day
- Assembly of the structure, iron bars and white goods : 1 to 2 days
- **4.** Hydraulic conduit : 1 to 2 days.
- **5.** Assembly of the technical room and installation of the liner 2 or 3 days.

Volume of concrete per block 1.25 m : 47.9 l / 0.0479 m³ either 0.0383 m³/ml/row Or127litres/m² of wall surface area.

Materials required :

- Board
- Cement mixer
- Sand/cement/gravel
- Mesh/Iron bars
- Drill
- Angle grinder
- Tube cutter saw

IMPORTANTE NOTE To ensure the SOLIDBRIC pools are watertight, only use a liner or onsite lining system Any other process is forbidden.

GETTING STARTED

SolidBrug

TECHNICAL TABLE For a total height of 1.50m (waterline 1.40m)

	INSIDE DIMENSIONS OF THE POOL IN METRES	6x3	7x3.50	8x4	9x4	9x4.5	10x5	11x5	12x6
DATA	Usable surface of the floor in m ²	18	24.5	32	36	40.5	50	55	72
	Slab Surface minimum : Usable length +1.5m)X(Usable width +1.25m)	31.88	40.38	49.88	55.13	60.38	71.88	78.13	97.88
	Wall surface base 1.50m - in m ²	27	31.5	36	39	40.5	45	48	54
	Perimeter of walls in metres	18	21	24	26	27	30	32	36
BLOCKS & PROFILES	Number of Straight Blocks 1.25m	80	90	100	110	115	125	135	150
	Number of sets of 2 plugs	20	20	20	20	20	20	20	20
	Metal profiles in metres	18	21	24	26	27	30	32	36
CONCRETE	Volume concrete wall*. base 1.50m in m ³	3.64	4.22	4.79	5.17	5.36	5.94	6.32	7.09
	Base concrete volume 12cm in m ³	3.83	4.85	5.99	6.62	7.25	8.63	9.38	11.75
	Total concrete volume m ³	7.47	9.06	10.78	11.79	12.61	14.56	15.70	18.83
IRON	Horizontal Concrete irons Ø10mm (per 6m)	22	25	29	31	32	36	38	43
	Either in metres	132	150	174	186	192	216	228	258
	Vertical Concrete irons Ø10mm (per 6m)	20	23	26	28	29	32	34	38
	Either in ml	117	135	153	165	171	189	201	225
	Total of reinforcing bars Ø10mm (per 6m)	42	48	55	59	61	68	72	81
	Estimated number of wire-lath sections 2.4 X 3.6m (including overlap)	5	7	8	9	10	12	13	16
	Number of footings for banched wall. base 4m Ø10m	6	7	8	9	9	10	11	12

*S3 flowable concrete with superplasticizer



CONCRETE SLAB

THICKNESS 12 cm CONCRETE Dosed at 350kg/m³ WELDED WIRE MESH PAFC 80C Ø 4 mm or equivalent FOOTINGS /LINK BETWEEN SLAB AND WALLS For banched wall Ø 10 mm

For constant depth floors, think about using self-leveling concrete. Ask your supplier for advice.

WALLS

THICKNESS **15cm** CONCRETE **Dosed at 350kg/m³ Class C25/30 S3 maximum** (Abrams cone technique)

1 IRONS BARS FOR CONCRETE **TO Ø 10 mm every 25 cm (vertical)** 2 CONCRETE IRONS **de Ø 10 mm every 30 cm (horizontal)** THE WALLS **They can be poured in several steps**



joints for maximum strength. O 75M 6X3M = 80 BLOCKS OF 1.25M 1 ROW = 14 WHOLE BLOCKS + 2 BLOCKS CUT AT 0.75M 0.75M 1M 7X3.50M = 90 BLOCKS OF 1.25M 1 ROW = 16 WHOLE BLOCKS + 2 BLOCKS CUT AT 1M 1M 0.75M 0.50M 8X4M = 100 BLOCKS OF 1.25M 1 ROW = 18 WHOLE BLOCKS + 2 BLOCKS CUT IN SECTIONS OF 0.50M AND 0.75M 0.50M 0.75M 0.50M 0.50M 9X4M = 110 BLOCKS OF 1.25M 1 ROW = 20 WHOLE BLOCKS + 2 BLOCKS CUT IN SECTIONS OF 0.50M 0.50M 0.50M

another. The blocks must be staggered across the

concrete pouring (to be placed next to the wall every 2m max.).

Provide 1 set of plugs per corner and per rank either 20 sets of 2 for a 1.50 deep rectangular pool or 16 sets for a 1.20m deep pool.

NOTA BENE

The quantities are calculated to limit block loss and offcuts. Solidbric is sold in full pallets of 40 blocks each.





GETTING STARTED

SolidBric

See what type of ground you

have as it will decide the

way you dig

it as well as

the cost.

and evacuate

THE SHAPE OF THE FLOOR

Hopper or constant depth.

The pool can be made with a flat floor of 1.50 m, (5 ranks of blocks), or else with a hopper. In this case, the wall of the pool will ideally be 1.2 m (4 rows of blocks) and the floor will be drawn as in the diagrams below.



Rocky ground: you will need a tool to breack the rocks, it takes more time to dig and to evacuate the earth Clay : Evacuate the earth



Do not draw the deep end too deep : the shorter the pool is, the steeper the slope is, it is not as safe for swimmers as they get surprised, divers may also think it is safe even if it is not.

For constant depth, the Solidbric block contains a cutting line at 5 cm. This results in a constant depth of 1.45 m, or 1.35 m of water, which is very useful for children's play and people under 1.65 m and reduces the volume of water to be treated and heated.



Recommended flat shapes





Shaped wall floor

Floors with regular slope and deep ends are more difficult to build. You will need to cut the first row of blocks perfectly straight and even, and you will need to secure it with concrete before getting on to the next row.

Complicated floor shapes



GETTING STARTED

SolidBrug_ EARTHWORK

The pool surround must slope away from the pool to allow rain water to drain away from the pool into a drainage system.

Installation

The pool structure must be imperatively placed on a stabilized ground.

Avoid installing on backfilled soil that is less than 20 years old*. Align the swimming pool with an already existing building (house, terrace, etc...) so that your pool is well integrated into the environment of your property. Ask your townhall about any administrative permissions rovisions or permit you may need (check local regulations). Once you have determined the location of your pool, locate the 4 corners (with 4 stakes or iron stakes) of the inside dimensions. checking the diagonals of the rectangle :

Example Length 8 m / Width 4 m / diagonal = 8.94 m



Diagonals 6 x 3 m = 6.71 m 7 x 3.50 m = 7.8 m 8 x 4 m = 8.94 m 9 x 4.50 m = 10.06 m 10 x 5 m = 11.18 m 11 x 5.50 m = 12.30 m 12 x 6 m = 13.41 m

Method«3-4-5» with Pythagorean theorem



A - A' being a parallel side to a terrace for instance, AB = 3 m / AC = 4 m / BC = 5 mThis method gives a 90° angle

Also locate your steps if it is outside the rectangular structure (Roman style, square, oblique): The slab base will include it in the dimensions of the base.

As it is a pool with a block structure, it is necessary to add 0.50m to the dimensions of the pool on each length and each width. It gives a minimum of 25 cm of «working area» (for walls not supporting the passage of pipes) and 50cm for walls receiving the outlets and skimmers :

 $8 \times 4 = \text{Length } 9 \text{ m} - \text{Width } 5 \text{ m}$).

Example

Swimning Pool of $4 \times 8 = 4.5 \times 8.5$ of structure Width of earthwork : 4.5 + 0.25 + 0.5 = 5.25 m Length of earthwork : 8.50 + 0.50 + 0.50 = 9.50 m when the outlets and skimmers are placed opposite on the widths. This zone therefore enables :

• To circulate around the structure to carry out the hydraulic circuit of rigid PVC pipes,

• to have room to put the pipes through and make the supporting plots of the deck (with Ø160 ou 200mm of rigd PVC pipes or with vertical concrete blocks located outside the pool every 2m).

It is therefore highly recommended to have the concrete slab cover the entire surface in order to be able to work cleanly and on a flat and solid base.

Next you will have to determine the finished height of the pool. This finished height will be determined in relation to another fixed point such as an entrance door or an existing terrace for instance.



GETTING STARTED

SolidBrug_ EXCAVATION And preparation of the concrete floor slab

Excavation dimensions

It is strongly recommended that you ask a professional to carry out the excavation, to ensure it is correctly prepared and level.

You first need to draw with chalk or with a specific fluorescent marker where is the digging part to take place.

It is essential that you use stakes to align the length and width to the EXACT dimensions of the pool in order to reposition the 4 corners exactly in the bottom and properly shape the slab where it should be.





Make sure you plan to have all pipes (skimmer, returns) along the same side to limit the backfill as well as the amount of sand that will be put on those pipes.



Take into account the height of the deck or terrace in the calculation of the depth

In order to work in a dry environment, it is often necessary to build a relief well. Check advice with your dealer for more information if required.

Excavation

From point «zero» previously determined, for a 1.50 m deep pool, it will be necessary to dig 1.62 m because of the 12 cm thick reinforced concrete slab + provide 5 to 10 cm of backfill with crushed draining stones, laid on a geotextile (very important because this stabilizes the gravel bed and maintains its draining power). Add to this, the thickness of the deck or terrace covering.



The floor should be well graded and perfectly levelled

Installing the main drain

Before placing the welded mesh, put the pipe in place for the main drain, dig a small trench so that the pipe is not caught in the concrete but underneath it.

The main drain is connected to its pipe (direct gluing or fitting + teflon + gluing depending on the model), then it is sealed with a mortar (sand + cement). Make sure you properly protect the upper part with the holes with adhesive tape after stuffing the main drain with paper to prevent the tape from going into the drain. It must be properly levelled with the slab.

Before starting the work, make sure you properly manage the volume of earth extracted, either by evacuating it or backfilling a sloping area for instance.

For information 1 m³ of naturally compacted earth = $1.33 \text{ m}^3 \text{ of}$ volume to be evacuated (overrun)

sand: $1 m^3$ compact = $1.10 m^3$ to be evacuated

Remember to save a few spare m³ for later backfilling. circulation Leave free (1m minimum) around the excavation.

Repositionning the 4 corners When the earthwork is finished and it is perfectly cleaned and levelled, reposition the 4 corners (stakes) using the alignment transfers previously carried out. always checking the diagonals.

Please see important note on Page 24 about main drains.



Make sure that the slab is flat around the main drain.

Allow the mortar to dry for 24 hours before moving on to the next step (see page 24).

GETTING STARTED

SolidBus THE CONCRETE FLOOR SLAB

Getting ready

Place a plastic film on the floor, all the more important if you make a constant depth type floor with self-levelling (liquid) concrete.



Steel footings for the blocks.

These footings are especially designed to help keep together the floor slab and the reinforced concrete walls. They consist of iron bars with a diameter of 10 mm bent at 90° angles and connected (welded) to the base with 3X8mm diameter threads.

BENEFITS are :

Perfect spacing and alignment, quick installation, increased solidity, floor/wall connection.



Laying the welded mesh

Cover the entire surface of the floor with welded mesh panels, overlapping them by about 20 cm minimum and tying them together.

Recommended dimensions of welded wire mesh : • Type "PAFC", mesh size 20x20 cm • Wire Ø 4.5 mm in sheets of 2.4x3.6 m.

It is not necessary to use large diameter wire (maximum Ø6 mm) or to make a base plate thicker than 12cm. The 20cm thick slab with two layers of large diameter mesh are only intended for tiled pools.

Here, we use a liner to obtain waterproofness and therefore, even if there are cracks or micro-cracks, this will not affect the strength and function of the liner, the structure carrying a liner must not be watertight.

However, we recommend that the floor and walls be secured with steel footings placed on the periphery of the floor mesh and firmly attached to it.



Wired mesh used as steel footings



If you don't use specific steel footings for concrete block walls, you will have to make them yourself :

- •Cut Ø10 mm/Length 1.20m concrete reinforcing bars, provide one every 25cm, i.e. for a 8x4 pool about 90 then fold them into equal brackets (60/60 cm).
- •Attach the brackets to the floor mesh. In order to keep each square vertical, you can dig a concrete reinforcing iron into the ground at the exact position of the square, leaving it about 20 to 30 cm out of the way,then attach the bracket to this bar.
- •To determine a perfect alignment of the brackets, place a bar (Ø10x30 cm twisted iron) at the 4 corners and use a string that will delimit the interior dimensions of your pool. As the blocks are 25 cm wide, position your brackets 12.5cm behind the line.

To help you determine the positioning of the 1st bracket (reinforcing bar), use 2 blocks to form an angle.



Positioning the brackets

In order to have the holes of blocks perfectly aligned (every 25 cm) on the irons (vertical angle brackets), it is necessary to position the brackets 12.5 cm back from the string, on all 4 sides.



Studs



When you pour the slab, make sure to have a perfectly levelled surface near the location of the blocks (brackets). If not, these blocks will not fit together perfectly and will leave gaps between them. The wall, although aligned at the base, would not be aligned at the top.

If the slab is not perfectly levelled, this also affects the plumbing of the walls and weakens the structure when it is poured.

In order to facilitate the construction of the concrete base, make studs of about 20 cm square every 2.5m to 3 m approximately.

Height of the studs: 12 cm (finished slab level). These studs are joined together by PVC bars (40mm or 80mm joints see photo) which will be used to perfectly level the slab using an aluminium rule of approximately 3m.



PUT THE IRONS BARS 25CM

APART = (Ø10MM)

V ALIGN BRACKETS (Ø10MM BARS -25CM BACKED OFF



GETTING STARTED

SolidBurg POURING THE CONCRETE SLAB

Pouring the floor slab

The correct method is to start by placing the concrete about 50 cm around the brackets on the entire periphery and finish on the inside of the slab.

• **Plant concrete:** order C25/30 concrete dosed at 350kg/m³.

• **By hand:** use a concrete mixer to pour your slab, with concrete dosed at 350 kg/m3

In order to perfectly level the concrete as it is being laid, it is advisable to use concrete mix composed of small grained pebbles (discuss with the supplier), this will avoid having to make a finishing screed.

If, however, you feel that the slab is not perfectly smooth, once the walls have been poured, you can apply a 10 to 15 mm thick finishing screed or partial patching.

N.B. Flat floors can also be made using self-levelling concrete, check with your Concrete Mixing Plant. BEFORE STARTING THE FLOOR SLAB : MAKE SURE : a/ Make sure blocks are interlocked tight with no gaps b/ Make sure bracing/supports are adequate, it is better to overbrace and we recommend to brace horizontally the base row so they do not move with the initial pour. c/ Make sure the concrete is the correct consistency and pour slow and carefully.







Pouring a flat concrete slab



Smooth and level around the brackets so that the blocks lie flat. on the slab. This is very important. If you have any doubts about vour abilities, ask for the help of a professional, if only, for this stage as it is very important to have it perfectly done.

Make sure you keep the wire mesh up throughout the pouring process to prevent it from resting on the bottom.



It is necessary that the wire mesh is under at least 3 cm of finished concrete

STRUCTURE ASSEMBLY

DESCRIPTION OF THE BLOCKS

Length 1.25 m Width 0.25 m Height 0,30 m Wall thickness: 5 cm

Get started from an angle. If the length of a block is to be reduced, cut with a saw only in increments of at least 0.25 m.

To fit the blocks on top of each other, after having adjusted the male and female parts, tap on the spacers with the palms of your hands.



Angles



Cut the male tab of the block with a cutter, which will stop in the corner.





Saw the 1st block from the top and bottom corners (leaving space for concrete + irons). Repeat this cut at each angle and for all levels.

Plugs

There is 1 upper plug (with 2 holes) and 1 lower plug delivered together, just separate them, 2 plugs per block. Even on cut blocks, every 25 cm, the block is designed to slide the plugs in (at each spacer).



Top and bottom plugs as they are delivered



Top plug before installation



Corner detail with assembled plugs

STRUCTURE ASSEMBLY

STEP BY STEP PREVIEW



SolidBug_ LINERLOCK COMPONENTS

It is recommended that you use linerlocks especially designed for thick walls such as Solidbric. Please find below our best selling linerlocks :



Extra wide 2metres X 10cm Item **# PSI-800-0024**



Extra wide 6" Radius corner 40cm X 9cm Item **# PSI-800-0025**



«Standard» linerlock Item # PSI-800-0027



Tread Rail Item # PSI-800-0026



Multicut Radius linerlock Item # CJP-800-0011

STRUCTURE ASSEMBLY

SolidBruc

BLOCK ASSEMBLY

Once the concrete slab is solidified, trace on the ground the inside dimensions of the pool, checking the diagonals.

Put the first row of blocks in place by perfectly aligning them: check the levels and plumbing Make sure you previously have the 4 corner stakes right along the slab.

First, position the 4 corners with whole blocks and always put blocks on top 25cm away from the corners, whenever possible.

Position horizontally inside the block (and then in each row) 2 concrete reinforcing bars of \emptyset 10 mm on the entire periphery. Overlap the junctions of two reinforcing bars (horizontal) by 50 cm and bind them with 2 iron ligatures.

Put the second row of blocks in place, taking care to cross them (25 cm overlap), which will ensure better stability of the structure during concrete pouring.

If you have to cut a block (with a saw), carefully follow the vertical line (see photo), and cut the block in the middle of the spacer (so that you can reuse the cut part).

Add another row of blocks, horizontal irons, until you reach the height you want. Vertical irons must be cut at least 3 cm below the top level of the last row.

Once the structure is assembled, check its plumbness and alignment and correct it if necessary by shimming the structure on both sides.







Detail of the crossing of the horizontal irons in the corners

Usina annealed wire or of ligatures, Attach 1 horizontal reinforcing bar to an iron. vertical concrete (square) approximately every meter to avoid possible lifting of the blocks during the pouring of the concrete.

STEP UNIT ASSEMBLY

SolidBric

Smoothing of steps and concrete floor slab

Concrete should be as smooth as possible. especially on the treads (the felt on the steps and the floor is only for comfort). To smooth the concrete, roughen it with a diamond disc if necessary and then smooth with a Lankomur Parenduit type panel smoothing machine, Sika Viscocim, for example (resin in paste form mixed with cement). This grouting is very easily hand sanded for a perfect result. This type of product also helps you screed and level possible looseness between the blocks.

MAKING A STEP UNIT WITH THE BLOCKS

VERY IMPORTANT

The top riser must be at least 28cm high for a good tension of the liner with a minimum of water above the first step.

All steps must be level and plumb, with sharp edges.

Floor blocks can be fixed with polyurethane foam, as well as junctions of steps with walls.



IMPORTANT : NF EN 16582-1 Standard

Applicable in France

Whatever the type of step design may be, it must have the following features:

- The first step when descending towards the bottom shall not exceed 40 cm, taking into account the thickness of the deck. If the sum of the riser + deck is > 40 and < 45 cm, a handrail or bath exit is mandatory. The maximum tolerance is 45cm, so it is forbidden to have to go down more than 45cm from the deck.
- Riser height, i.e. between 2 steps 33 cm max (the block is 30cm high).
- Width of the step (where you put your feet): mini 21cm. The blocks are 25cm and can be used in this way. We even recommend widening the steps to 30cm for better comfort.
- Minimum step width on both sides of the axis of the step unit: 16 cm, that is, a minimum width of 32cm.
- All edges must be sharp (90°). Do not round them off. Solidbric stair covers are suitable for 90° edges.
- The steps must be vertically plumb, horizontally level, and of regular depth (if not you may not be able to order your liner as it will be impossible to make). Check with your liner supplier what should be the standards to abide by , if your are not in France.



Before starting, check with your dealer to see if the step unit design you chose is in accordance with the requirements of the liner. If you cannnot order your liner, you will have to go for an on-site thick lining system.

STEP UNIT ASSEMBLY

SolidBruc

BUILDING THE STEPS WITH BLOCKS

Use straight blocks + PVC profile U-shaped step bars to make your steps. Each of them will be 30cm high

The step unit is not part of the structure. This being said, you can choose to reinforce stabilization of the step unit even more by drilling the slab and inserting 8 or 10mm vertical twisted irons every 75cm, to match the hollow parts of the blocks. Be careful, these irons must never be less than 3cm from the finished level of the step. Make sure to stay at least 5cm away to avoid any risk of rust rising under the liner.

Welded mesh can be used for the flat parts, but be careful not to make it come too close to the finished flat part of the step (at least 3cm away). You must use anticracking synthetic fibre instead of metal.

> U-SHA-PED TOP COVER

FOR STEP

5CM

Steps width of 25cm

Simply put the rows of blocks one agains the other and fill in with concrete.

Steps width of 30cm

Leave 5cm between the rows and fill in the concrete blocks, stopping at the spacer. Fill the gap of 5 cm between the blocks with crushed material (e.g. 6/10 gravel). Finish the concrete perfectly smooth and level.

> 6 TO 8 CM REAR CUT-OUT OF THE TOP BL<u>OC</u>K



STAY -5CM BELOW THE FINISHED CONCRETE LEVEL OF THE STEP!



6 TO 8 CM REAR CUT-OUT OF THE TOP

BLOCK

8 OR 10MM TWISTED IRONS TAKEN FROM THE SLAB BY SIMPLE DRILLING POSITIONNED EVERY 0.75M. STAY -5CM BELOW THE FINISHED CONCRETE LEVEL OF THE STEP!

STEP UNIT ASSEMBLY

SolidBruc

They are easier to make because they are part of the rectangular structure.

IMPORTANT

The steps are made once the structure has been fully concreted (the same day if all goes well). The steps can be placed in the corner or on the entire width To make such a step unit, the simplest way is to use the straight Solidbric blocks.

Corner step unit design For a 1.50m high structure



For a 1.20m high structure

INSIDE STEP UNIT





These steps can be made using Solidbric blocks and «U» type step bars.

To make a 30cm deep tread, simply offset the rows of blocks between them by 5cm, wedge them together and fill in the blocks with concrete. Below is the number of straight blocks required for a 3m or 2.40m base.



Pool depth	Number of steps	Width base bottom step	Number of straight blocks required	Number of 3m step tread rails required
1.50m	4	3m	18	4
1.20m	3	2.40m	10	3

It is also possible to make a corner step unit with a cosy 50cm bench. Check with your dealer for the required number of blocks.

These step designs are also possible, if they are made out of concrete, a liner will cover them. Ask advice to your dealer





Angle



Divisor

STEP UNIT ASSEMBLY



INSIDE STEPS Full width step design

VERY IMPORTANT

The top riser must remain 30 cm for a good tension of the liner with a minimum of water. above the first step.

All steps must be level and plumb, with sharp edges.



Floor blocks can be glued to the ground with polyurethane foam, as well as junctions of steps with walls.



Pisac plage

Banquette



Angle plage Minos plage There are many possibilities of stairs, benches. Check with your dealer for more information The technique is simple, as you only need to position blocks across the entire width.

The 1st step (the highest) or the 2nd step can be doubled, to make a bench. They can be poured with concrete once the structure is done or later.



Layout



Step unit with double width on first step

Pool Width	Wall Height	Number of steps	Total number For step unit desi of the Steps of the same width (25cm)	er of blocks ign on the width pool With step width X 2 (50cm)	Number of step trad rails (3m long each)
3.50m	1.20m	3	18	27	4
3.50m	1.50m	4	30	42	5
4m	1.20m	3	20	29	4
4m	1.50m	4	32	45	6
4.50m	1.20m	3	24	36	5
4.50m	1.50m	4	40	56	6
5m	1.20m	3	24	36	5
5m	1.50m	4	40	56	7
5.50m	1.20m	3	24	36	5
5.50m	1.50m	4	40	56	7
6m	1.20m	3	24	36	6
6m	1.50m	4	50	70	8

STEP UNIT ASSEMBLY

SolidBrue

This type of mounting locks the unity to the structure with the concrete and the wire mesh sheets

The liner will cover the steps (manufactured with final dimensions) once it is finished. The liner will be in one piece including the pool and the step part.

The step design can be square, rectangular or «Roman» (2.50 or 3M radius)

To make those types of steps, just use straight blocks as explained in previous pages.

OUTSIDE STEPS

How to make a Roman end

The radius will be done using the curved blocks and the 125 or 150mm radius inserts, you will need 4 per block. Important: the steps are made once the structure is fully concreted (not at the same time unless it is wedged from all sides).

The curved block has the following dimensions: 1 m long x 0.25 wide x 0.30 high

To curve the block : place it on a flat, firm surface (pool floor) and push the insertion wedge, pointing downwards, with the inscription R150 or R125 inside the block by pressing it with both hands and lifting it up in jerks to allow the block to bend. The blocks are then placed as for the rest of the pool, with an offset of the junctions at each new row and a vertical and horizontal reinforcement (if the bottom reinforcement does not reveal any waiting irons, drill the slab to slide the vertical irons in).

• 2.50m Roman end : use 4 curved blocks per row et R125 radius inserts.

• *3m Roman end :* utiliser 4 curved blocks + ³/₄ of a block + R150 radius inserts. Use polyurethane foam to put blocks together. Use a good quality one as some may push out the blocks. The excess parts will be easily cut off.

Joining the round part to the rest of the structure

Junction between the structure and the roman end



You see above how the step part Ist block must be pushed into the structure of the pool and be part of the periphery. The radius formed with the insert will be of 5125 or R150.

To give a proper finish to the angle you can sand it with a #80

paper).



Cut the curved block to to ensure continuity of concrete part and iron bars (as for corner blocks)



STEP UNIT ASSEMBLY



olidBric

For vertical angles of the

steps, use

OUTSIDE STEP END Square or rectangular end

Example of a 1.50m deep pool **IMPORTANT**

The steps are made once the structure is fully concreted (not at the same time).



it enables to form an angled corner. It makes easier to install the liner and to hang it.

Top View

















These step designs can be fitted with a liner, ask your dealer for the required dimensions.





Cut away view



WHITE GOODS

SolidBrue WHITE GOODS

The right positioning







Inlet







fitting (returns included).

WHITE GOODS



INSTALLING WHITE GOODS

Getting ready before pouring the concrete

Skimmers must be placed at least 0.50 m away from the angles.

Make sure it is watertight between Wall inlet flanges and white goods using "Teflon" (10 to 15 turns).

Before pouring concrete, you must position the white goods as follow :

- The bottom drain on the concrete slab
- 1 or 2 skimmers
- 2 or 3 wall flanges for the returns that will be mounted at a later date so as not to dirty them during the concrete pouring part.
- The light and its cable + cable gland
- 1 Wall flange and return fitting which will be fitted at a later date so as not to dirty it during the casting.

Position the white goods during the installation of the structure (wall):

 Return and inlet sockets : at least 25 cm from the top of the wall

• Light : at least 60 cm from the top of the wall

• Skimmer: at least 5 cm

Other optional fittings can be installed at this stage:

- Counter current device
- Automatic cover fittings

2 Identify the

different parts

FLANGE

Please contact your dealer for more information before you proceed any further.

MAIN DRAIN

BOTTOM MAIN DRAIN Must be postioned before pouring the concrete

Standard NFEN 16713 (April 2016) in France. The bottom drain must be of an anti-vortex type The use of flat grid drain is still possible but only if 2 drains are used at least 1m apart between their closest edges and connected together in the concrete slab or in the technical room and no possibility to block one or the other (only 1 valve for the 2 drains).



WHITE GOODS

SolidBrug

POOL FITTINGS : INLETS Getting ready before pouring the concrete



3 Then cut out the back of the 60mm block. Before installing the wall inlet, screw the inlet onto the wall inlet flange with a minimum of 25 to 30 turns of Teflon on the thread of the part to be sealed. Screw it in tight.





WHITE GOODS

SolidBruc

POOL FITTINGS : INLETS Getting ready before pouring the concrete



4

Push the wall inlet through as far as it will go.

The 30 cm wall inlet goes outside from the back so that they can be blocked if necessary by a 2" nut.

Protect all White goods withadhesive tape.



5

Tighten it so that the collar of the part is well tightened flat against the wall.



6

Protect with adhesive tape during the entire concreting operation.

The white good (in this case the wall inlet) can be fixed with foam. This foam will also be used to fill in oversized cut-outs or accidental holes caused along the assembly.

WHITE GOODS

SolidBruc

SKIMMER Getting ready before pouring the concrete

1

Cut the flat parts on each side of the loophole, as well as underneath (hacksaw, grinder), if necessary. PROTECT THE PARTS TO BE SEALED with adhesive tape before pouring concrete.

2

Cut out the blocks according to the track's external dimensions.





3

Cut out the block on the backfill side to the width of the skimmer extension so as to position it perfectly level, then close it with a well-padded polystyrene scrap.

Finish with the reinforcement by placing the last 2 iron bars at the level of the skimmer for the structural continuity of the reinforced concrete.

In the case of mirror type skimmers where the level may be high, the irons will have to be passed in an inverted U shape under the skimmer to ensure that they are set under at least 3 cm of concrete.



The skimmer flange must be postioned perfectly level and plumb with the wall.











olidBric

LIGHT Getting ready before pouring the concrete





Position the centre of the projector 55 cm away from the top of the wall.

Draw a circle with a diameter corresponding to the projector and the impressions of the flange screws of the niche to be sealed*. Cut with a hacksaw blade.

Do not use the entire diameter of the projector as a template cutting!

*Example: 3481 or 3487 Hayward Skimmer Hayward: 262mm Superpool / Weltico Design light: 245mm



If necessary, cut the irons that interfere with the light installation (whichever the light may be).



PROTECT THE WHITE GOODS with adhesive tape before pouring concrete.

Once the cable gland has been fitted tightly over the niche (Teflon) and passed through the rear of the block, lay the light flat on the wall or with the flange line levelled.

You can leave the optic in the niche (without the bulb or the hubcap to avoid dirtying them). Block it with tape or fix it between 2 blocks with a simple screw (which you will need to remove later).

Then, you can keep it in place with a wooden board that will serve as a brace during the concreting (see next page).



CONCRETE POURING

TOP PART OF WALLS & ANGLES

BEFORE pouring concrete The top of the walls have to be perfectly level as you will position the metal rail (profile or liner lock) on it and above the coping stones for the pool deck.

It is therefore necessary to cut with a cutter all the cleats that are used to fit the blocks together. Then position the Solidbric U-shaped rail by simply interlocking it, leaving the 4 corners free as shown here. The corner pieces will be laid after the concrete has dried. This cutaway angle can also be made with the U-shaped rail, which must be recessed into the polystyrene and made to protrude. It will be caught in the concrete, before pouring. In both cases, make sure that the height of the rails coincides with the level of the groove of the profile.

PROTECT THE WHITE

GOODS with adhesive tape before pouring. Also protect the groove of the liner rail.

Once the white goods are in place (light or skimmer), use a vertical board and place it against it (to prevent the concrete pressure from pushing them out of their location). This board must be blocked on the ground and at the top (by a clamp).





In the case of concrete delivered by plant (mixer), it is also necessary to wedge the walls from the inside, using vertical boards placed about every 2m. These boards will also be used to adjust the verticality of the wall.

and alignments. Check the diagonals one last time and adjust if necessary.

If an on-site lining system is to be

It is recommended to also brace the lower level of the wall and to make sure the concrete and pump pressure is as stated otherwise the bottom block could lift.

installed, the «Solidbric» profile is not recommended. You will have to use an extra wide 9 cm flat PVC or Aluminium profile, to be placed on top of the wall, levelled and fixed with stainless steel rivets or 100% nylon ankles every 25 cm. **CONCRETE POURING**

SolidBrue

RECOMMENDATIONS What type of concrete is to be

used?

No liquid concrete!! **NEVER ADD** WATER to the pouring process If you forgot to lay the U-shaped profile, a flat PVC or aluminium rail of 9 cm will then be riveted every 25 cm on top of the pool once dry.

C25/30 dosed at 350kg/m³, class S3 maximum, (Abrams method), with superplasticizer. It is MANDATORY to start with the 4 corners on a height of 1m MAXIMUM and then to reload peripherally by turning on 2 rows max. It is recommended to pour the concrete in a progressive way.

You can mix and pour the concrete yourself. Wedge and brace the wall as described on page 29. Ideally fill the first 1.5 level of blocks. Let this go off overnight and then complete the pouring the next day.

Once the concrete is poured, level the upper part of the wall, this will facilitate the installation of the coping stones, then clean the liner profile.

STEP BY STEP PICTURES



Be careful to prime the pump outside the structure.







The liner profile must be cleaned before drying.

MANUFACTURER RECOMMENDATIONS

If you decide to pour the walls with a router and a concrete pump, it is mandatory to ask for the driver to place at the end of the hose a gooseneck that will slow down the concrete when falling





CAREFULLY FOLLOW THE FOLLOWING RECOMMENDATIONS

If you pour 1,50m IN ONE GO : it is preferable to install a 40 cm high scaffolding inside the swimming pool (made of cinder blocks and planks...). in order to control and visually monitor the filling process.

RUN ON THE SPACERS (junctions between the inner and outer walls of the pool) and not directly into the vertical chimneys.



DO NOT USE **a vibrating** needle

TO LIQUEFY THE CONCRETE of a concrete mixer, it is mandatory to use a superplasticizer and under no circumstances the addition of water. It may cause some blocks to burst. Avoid pouring concrete by negative temperatures.

CONCRETE POURING

SolidBric

CONNECTING THE WHITE GOODS



The elbow must rest on the overflow of the slab. + mortar block

Do not cross your pipes at the bottom of the excavation, to avoid crushing and give play to the flexi PVC pipes.

> Sand your pipes with 20 cm of stonefree sand

Failure to observe these precautions would inevitably result in leaks that are heavy to repair.





Locate the pipes in the technical room: the inlet fittings on one side, the return outlets on the other).

TIP: 1 white good = 1 pipe to the technical room in order to be able to isolate each water connection piping. 1 The male parts to be screwed on must be teflon-coated. and not glued.

2 The parts to be glued must be sanded, stripped and then glued (double gluing).

3 the flexi pipes should only be glued with the special blue adhesive after stripping it with PVC solvent.

Skimmer

1 Under the skimmer, screw a straight male/female coupling to be glued. Glue it with the rigid PVC into the fitting.

2 Glue a Ø50 elbow to the other end, which is wedged to the floor.

3 Glue the pipe to the other end of the elbow.

4 Make an overflow on the upper side or rear exit of the skimmer, (its pipe must go under the terrace slab).

Return and vacuum fittings

1 Glue a Ø 50 tube in the wall inlet and let it protrude 3 to 4 cm, make a slope as shown in the diagram opposite.

2 At the end of the rigid PVC pipe, glue the elbow, at the other end of the elbow glue the flexi pipe.

IMPORTANT

Do not use flexi pipe for the vacuum fitting as it will be impossible to connect a booster pump. Use a polyethylene pipe instead





olidBric

PRINCIPLE

Backfill and protection of exterior walls

Place a draining Delta type anti contaminant protection. On the periphery of the outside walls by fixing it on the top of the wall before backfilling.

The backfill should be made of crushed gravel after sandblasting. of piping (20 cm).

Do not backfill with earth (it is very likely to settle a little and provoke cracks on the deck around the pool).





Important information about skimmers

Before the concrete deck is built (if the case applies), make sure that the skimmer bodies are not caught in the concrete.

It is imperative that they be unlocked from the slab. To do so, surround them with polystyrene before pouring concrete for the slab of the pool deck.



WATERPROOFNESS & FILTRATION

SolidBric

WATERPROOFING

The Solidbric blocks will be waterproofed only once the liner or the Proflex on-site lining system is in place.

Before installing a liner, it is imperative to apply a thick felt and glue it with a dedicated felt glue spray such as Superpro glue.

The installation of the liner is an important step, we recommend it is done by a knowledgeable professionnal.







500ml - 25 à 50m²

5kg jar - 50m²

SolidBrug__ FILTRATION

The assembly of the technical room depends on its equipment. Please contact your dealer for more information. Carefully read each installation manual of your equipment.



TIPS & ADVICE

SolidBruc

They are a lot of devices available to secure your pool. Among them you find alarm devices, enclosures, bar covers, automatic covers...

In France, as soon as you have water in the pool, it is mandatory to secure it with an approved device.

Safety Surveillance

Children must be closely and constantly supervised.

- Designate a single safety officer.
- Reinforce surveillance when there are several users in the pool.
- Give a personal flotation device (for those who cannot swim).
- Teach your children to swim as soon as possible.
- Wet your neck, arms and legs before entering the water.
- Learn life-saving techniques, especially those specific to children.
- Prohibit jumping and diving in the presence of young children.
- Prohibit running and lively games around the pool.
- Do not allow access to the pool without an approved safety life vest or arm bands for an unaccompanied child who cannot swim well in the water.
- Do not leave toys in the vicinity and in the pool that is not supervised.
- Keep the water clear and healthy at all times.
- Store water treatment products out of the reach of children.
- Provide an accessible cell phone near the pool
- Provide a buoy and a pole near the pool.



- Standard NF EN 16582-1 in France requires the installation of 2 pictograms less than 2m from the pool:
- The pictogram ISO20712-1 WSM002«Keep children under surveillance»
- The pictogram ISO20712-1 WSP005 «Do not dive»



No approved safety system can replace your active surveillance.

Teach your child how to swim as soon as possible and make him or her aware of the danger.

Learn life-saving techniques.

Bear in mind that a child can drown in silence, in less than 3 minutes, in 20 cm of water.

In case of an accident

Get the child out of the water as soon as possible.

TIPS & ADVICE

SolidBruc

To fully enjoy your pool, carefully follow the instructions on this manual. If any items are missing, visit your nearest retail pool shop.



It's advisable to fill your pool with mains water which is safe, balanced and does not not contain metal particles.



Never move the multi-port valve handle while the pumping is running.

POOL MAINTENANCE

Normal operation of your pool

WATER LEVEL Ideally at the 3/4mark of the skimmer. SKIMMER The basket must always be clean, use a disposable

Net'Skim prefilter (on sale at your retailer). PUMP

The prefilter should always be clean and emptied at least once a week unless Netskim nets are used on Skimmers baskets. FILTER

The operating pressure is 0.400/0.800 bar. As soon as the pressure rises, the filter must be washed. FILTRATION TIME

The rule is to divide the water temperature by 2 to get the number of running hours.

e.g. water at 28°C, minimum filtration time will be 14h. POOL CONTROL PANEL

With a thermal protection of the pump motor : an adjustable calibrated circuit breaker protects the pump. Before anything, make sure that this one is switched on. You may need to adjust the power dial if it fresquently jumps.

The procedure for setting the clock can be found in the instructions supplied inside the box by the manufacturer. 6-WAY VALVE

Read carefully the operating instructions supplied with the filter.

(see page 38)

Water treatment

General safety instructions :

Never mix products

- Carefully read the instructions on the labels
- Never breathe the product (dust, vapours...).
- Avoid contact with skin, eyes or clothing.
- In case of contact with skin or eyes, rinse with plenty of water and consult a specialist.
- Always put the product in water, do not pour water on the product.
- Store in a cool, ventilated and dry place.
- Keep away from sources of heat, sparks, or flame.
- In case of fire or explosion, do not breathe fumes.
- Do not release into the environment
- Store in the original container, always keep tightly closed.
- All these products are harmful if swallowed.

Tips

- In order to avoid a limestone precipitate, it is advisable to add an anti-limestone product when you put water in your pool. The mineral particles in your water will thus be kept in suspension, avoiding any risk of dirt or organic deposits on the walls of your pool.
- This operation must be repeated each time water is added.
- After shock chlorination/shock oxygen/shock bromine treatment, run the filtration for 36 hours nonstop.
- No flocculation with diatomaceous earth filters or cartridges, with the exception of with the FLOVIL brand, specially designed for cartridge filters.
- An anti-algae compatible with bromine is mandatory with the bromine treatment.
- Clean the filter twice a year, it is recommended to carry out at least one descaling with a suitable product. This operation will restore the sand to its full filtration fineness.
- Thoroughly clean the waterline (surface). Grease contained in sun oils collects on the surface and deposits on the edges of the pool. These greasy halos are unsightly and conducive to the development of algae and bacteria. Use a specific product to properly clean your waterline, as well as the inside of your skimmers.
- Add «new» water to your pool regularly and throughout the year. By doing so, you will recharge your pool with mineralized water.
- Do not use products such as copper sulphate because they accumulate in water and in the body and can harm your health (digestive system), colour your hair or your pool liner.
- To clean the floor of the pool (dead algae/deposits...) without disturbing it, it is advisable to use a vacuum broom without a brush. Avoid using electrical appliances as when you reopen your pool as these could quickly become clogged up and put back into suspension algae deposits.

TIPS & ADVICE

SolidBric

Never add chemical products directly in the pool



Do not use sulphate (such as Bordeaux mixture, to treat plants in your garden) nearby your pool. You may risk to see staining or discolouring your liner

POOL WATER TREATMENT

A swimming pool is a place of relaxation for your family. However, a minimum of maintenance is necessary so that the water in the pool remains pleasant and does not present any risk to swimmers. Please find below all the possible solutions to keep your water clean and healthy.

- Active oxygen (only if water temperature is under 28°)
- Bromine
- Chlorine
- Algaecides

But other priority factors cannot be overlooked, such as pH level, hardness (T.H.) or alkalinity (T.A.C.)

Water balance

This is the essential key to ensuring optimum efficiency in the treatment of your water. This balance is maintained by 3 factors: pH, hardness (T.H.) and alkalinity (T.A.C.). These 3 factors make up the Taylor's Watergram.

PH

The pH level (Hydrogen Potential) indicates the acidity or basicity of the water. Adjusting the pH is the first and most important step in balancing your water. Your pH should be between 7.0°/7.4° in order to optimize the maximum efficiency of the treatments. This rate must be frequently checked because a large number of factors can disturb it (rainwater, temperatures, etc.). In order to keep the pH level at a normal value, several solutions are available. To measure the pH level of your pool, you can obtain control kits available from your dealer. Easy to use, the strips will show you the pH and many other parameters. Once the pH is measured, and if adjustment is necessary. you will need to use pH Increaser or Reducer depending on the results of the test.

But the easiest way to adjust the pH is to install a pH control. These devices are very effective and limit the consumption of product because the slightest variation is corrected without delay by small injections.

Hardness

It is used to measure the concentration of the overall calcium and magnesium salt content.

- 8° to 18° F, the water is moderately hard
- 18° to 30° F, water is hard

- Above 30° F, the water is considered very hard. Water above 20° F is highly laden with limescale, which means that it is highly calcareous for your

installations, which can degrade your equipment. In order to remedy T.H. problems, it is recommended to use a hardness stabilizer (limescale sequestering agent), available from your dealer. Ask your dealer for information about problems due to high T.H. levels.

Alkalinity

It represents the amount of bicarbonate and carbonate ions in your pool water. It indicates the capacity of the water to absorb pH fluctuations (buffering capacity). Its ideal value should be higher than 10° F. If this value is too low, the use of a specific product will reinforce the buffer effect. CAUTION In hot weather, after a heavy storm, the alkalinity level must be checked.

Taylor's Watergram

Studies on water balance data have led to graphs to evaluate the Calcium Hardness, alkalinity and pH of a balanced water. Measure the hardness and the alkalinity, draw a line between these 2 data to obtain the equilibrium pH. However, as the ideal pH for swimming is 7.2°, it is preferable to adjust alkalinity and hardness to get as close as possible to this value. A balanced water when the 3 parameters form a straight line through the comfort pH.



Taylor's Watergram

TIPS & ADVICE

SolidBric



Winterising is mandatory. During the winter, regularly check the water level below the cover. You must not let the pool overflow.



Even in winter, when your pool is closed, you must remain in compliance with the standard on swimming pools (France)

Ask for advice to your dealer

Winterising plug

WINTERISING

Winter is coming and the swimming season is over.

It's time to protect your pool from the cold weather, so that you can have a pool in perfect condition after the few winter months.

Why winterise a pool?

What is winterising, exactly? It's the term for closing your pool during the coldest months of the year. By properly winterising your swimming pool, you can help protect your pool from temperature- and weather-related damage while it's not in use. Winterising can also help keep your pool free of contaminants, dirt, and debris – which means you'll be one step ahead when it comes time to open it up again for the spring and summer.

How winterise a pool?

- First of all, clean your pool (waterline, walls, skimmer baskets, etc...). This step is essential to keep a healthy water.
- Special attention must be paid to the filtration system, which must be protected. Descale and disinfect the filter thoroughly, using a special «filter cleaning» product sold in stores. Clean and rinse well the filtration system.
- Next step is to balance the pH and alkalinity level of your water and perform a shock treatment with the disinfectant you usually use.
- Your water is now clean and ready to be closed.
- Check that the water level is well within 3/4 of the skimmer.
- When the filtration and pump are stopped, the algae grow much faster, so it is strongly advised to use a winterising product to avoid any encrustation of lime and dirt. This will also make spring cleaning easier.



A few more steps to go

In areas where it is likely to have negative temperatures during the winter with possible frost, it is important to do the following :

- Drain the filter, empty and isolate the external pipes (using gizzmos and plugs) to avoid expansion due to frost, purge all equipment (heat pump etc.).
- Use anti-freeze latex plugs for all outlets.
- The use of winterising floats is also recommended to prevent ice pressure from building up on the walls of your pool.



Your pool is ready to be covered. It is advisable to use a pool cover especially designed to effectively protect your pool from debris, leaves and other dirt during winter time. You can opt for a safety winter cover (compliant with the NFP90-308 standard in France) which will take over your alarm so that your pool remains safe even during the winter season. In this case, the decks must be made of concrete for the fastening system to comply with standards.

ACT-500-7025

TIPS & ADVICE

SolidBrig

MAINTAINING YOUR POOL

Your pool retail shop specialist is :

You must stop the pump before handling the 6-way valve

Filtration

Ideally filter during the day

Set the valve to filter mode. Then switch on the pump. Choose the required filtration times according to the water temperature : the rule is to halve the water temperature to obtain the daily filtration time in hours:

e.g. Water at $28^{\circ}/2 = 14$ hours per day of minimum filtration time. Favour hot hours.

Cleaning the filter

- Stop the pump and set the 6-way valve to WASH mode and open the valve to allow for draining if necessary,
- Switch on the pump for 1 to 3 minutes, depending how dirty water is
- Water: Observe the water flowing through the clear indicator and wait for the water to become clear,
- Stop the pump, turn the valve to FLUSH position,
- Start the pump again and let it run for 20-30 seconds, then stop the pump,
- Put the valve on FILTERING mode , close the draining pipe.
- Then turn the filtration back on.

For an intensive cleaning (strongly recommended when opening the pool), use ACTI Filter Cleaner to remove limescale deposits and greasy substances and to extend the life of your sand and limit the consumption of products.

Cleaning your pool with a manual device Leave the 6-way valve on FILTRATION. Then turn on the pump. Submerge the

Leave the 6-way valve on FILTRATION. Then turn on the pump. Submerge the brush and fill the vac hose with water using the return outlet. Then keep water inside by putting the palm of your hand on the hose, then plug it to the robotic outlet. If the suction is too weak, gradually close all suction ports : suction valves of the skimmer(s) and main drain.

Water treatment

Please see page 36.

Water level

Check that your water level is always at least 3/4 of the skimmer openings (filter washing or natural evaporation can lower the water level in the skimmer).

Safety tips

Store your chemicals in a well-ventilated place out of the reach of children. Follow the instructions on the packaging. Do not store chlorine tablets and fast acting chlorine side by side. Do not mix different products, even in the skimmer. Always add the product to be dissolved in water and not the other way around.

IN FRANCE : Loi Art. L 128-1 « In-ground, private, non enclosed private swimming pools for individual or collective use must be equipped with a standardised safety device to prevent the risk of drowning». We remind you that even if one of the safety devices must obligatorily equip the swimming pool, it does not replace the presence of a vigilant adult nearby.

Positions of your Multiport Valve Please refer to multiport valve operating instructions.





VISIT OUR WEBSITE! FIND OUT ALL ABOUT THE AVAILABLE EQUIPMENT, CHECK OUT THE LATEST TRENDS,



WHERE OUTDOOR LIVING COMES TO LIFE

Trend Alert

Seasonal Advice

Design Inspiration

Flowing waterfall feature with

natural rock motif

Explore the photo gallery to discover all the

latest trends related to swimming pools

and sound



Gardien Lensure provides the perfect backdrop for the infestyle you deserve. Learn more about above-ground asymmetry pools.



Variable-Speed Pumps for an Energy-Efficient Pool

Variable speed pumps are the balant innovations in pool equipment technology – but are they the right choice for your seeming pool? Do the benefits of these etc...



Our Featured Products



Beachcomber Hot Tubs



Aquaness Pool Fitness



Zenit Electric Pool Cleaners



