

INSTALLATION GUIDE FOR THE “ACTIVEBLOCK” CONSTRUCTION SYSTEM

1) Tools

- ◆ Carpenter's Hand Saw
- ◆ electric jigsaw
- ◆ Measuring tape
- ◆ Hammer
- ◆ Drill with hammer and vidia bit Ø 5 and Ø 6
- ◆ Level
- ◆ Plumb
- ◆ Formwork type malleable wire and tongs
- ◆ Tools for cutting and bending reinforcement
- ◆ Battery or mains powered screwdriver

2) Other materials

- ◆ 0.77 mm malleable wire for formwork
- ◆ Props and scaffolding are special for the system
- ◆ Planks for scaffolding are ideal. Formwork boards (200 x 50) cm
- ◆ Rules or strips 25 x 75 mm
- ◆ Parkers 4 x 30mm
- ◆ Screws for concrete with Ø 6 bit
- ◆ Steel nails 17 / 70 and 18 / 80
- ◆ Spax Screws – S Senkkopf T 25 DBD 5 x 70
- ◆ ABC Spax Screws – Spenkopf Z2 DBD 5 x 50

3) Conditions for the foundation

The foundations are intended to receive the loads and distribute them so as not to exceed the safe load limit on the surface that supports them. The foundations that support the “ActiveBlock” construction system must be built as described in the TGB 1990.

When the limits indicated in section 9.15.3 are exceeded, the foundations must be designed by a qualified technician.

It is advised that the foundation is made and built with a tolerance of about 5 mm.

When a stepped foundation is necessary, it is recommended to select vertical sections of 42.5 cm, to avoid unnecessary cutting of the elements.

4) The expansion of the walls

Place the exact positions of the perimeter of the wall on the foundation (interior face) with a thread / chalk.

25 x 75mm leveling boards can be used, fastened with 40mm concrete nails . around the perimeter of the wall foundation. This maintains the position of the first course in a simpler way during the construction phase.

5) Hollows

Consult the drawings of the openings for doors and windows and mark their position on the foundation strip.

6) Preparation of the material

Place all materials, tools, wall braces, and scaffolding material within the perimeter of the foundation prior to placing the first course of elements.

7) First course

Always start the first course in a corner with the placement of a corner element (right or left) and then the next one (generally a standard element) Following the foundation / floor line, all the elements of the first course can be placed in the same manner.

Holes or irregularities in the foundation course can be corrected by adapting the underside of the element with a saw or leveling with “PUR” foam or mortar to achieve a level surface. When the foundation is not level, it is recommended to tie the second course to the first course using wire.

When the guide boards are not used, it is advisable to tie the corner elements with the standard elements to avoid displacement of the wall at the moment of pouring the concrete.

8) Cutting the elements

When an element must be cut, it will be done through one of the notches located on one side of the element, so as not to damage the profile. Elements can be easily cut with a carpenter's hand saw. The cut material can be reused as long as only one connection profile remains. Avoid cutting corner elements, cut only standard elements. The cutting of the elements may be necessary for the exact placement of windows and doors.

9) Arming of walls

When plans or specifications recommend reinforcement on the first course, it must be entered before placing the second course. Ten notches have been introduced in the connection profiles that facilitate the placement of reinforcements of Ø 10, 12 or 16.

Layout and placement of reinforcement is done in accordance with local building code.

The necessary armor is determined by a qualified builder (architect or rigger)

10) Instructions for assembly

Position the armor. Measures and quantities according to the manufacturer's specifications.

Position the horizontal reinforcement alternately in each course so that the vertical reinforcement can be placed in between and tied before concrete is poured.

11) Laying the second course

Laying the second course can, like the first, start at a corner, this time in the opposite corner. The corner “ActiveBlock” element is placed on the previous course and the connection profiles are aligned so that they are on top of each other. By aligning the connection profiles, a vertical reinforcement is achieved every 20 cm, from center to center. The elements must be stacked joint-breaking (minimum 40 cm offset) to avoid long vertical joints. When the connection profiles have been aligned, the elements can be fixed together by pressing the upper element on the lower one. You can hit the top element with the palm of your hand to get a good connection with the bottom course. The remaining rows of elements can be placed in the same way as described in chapters 2.3.4 – 2.3.6 of this manual.

12) Openings for doors and windows

Openings for doors and windows can be achieved by placing a wooden pre-frame of the desired measurements. This pre-frame can be used to fix the window or door frame and to fix the interior and exterior finish.

The pre-frame can be made, for example, of lateral or upper “multiplex” pieces of 12 mm or 50 x 300 mm. Two 50 x 100 mm pieces of wood are made to serve as the lower part, so that concrete pouring can take place between the intermediate space. Make sure there are extra cross braces in the large openings.

When the “ ActiveBlock ” construction system is in place and the joinery work for doors and windows has been placed in the desired places, it is advisable to prop up the joinery with 25 x 100 mm planks. This achieves a good connection between the EPS elements and the carpentry and that the square shape is maintained during the pouring of concrete.

Before pouring the concrete into the “ ActiveBlock ” elements, the carpentry elements can be anchored to the wall by means of nails (minimum length 75 mm) around the perimeter of the frames at a distance of 300 mm center to center.

Items above door and window openings should be tied together to prevent collapse of the plank course.

13) The propping of the walls

The forces that appear during the pouring of the concrete are reduced by the “ ActiveBlock ” wall and the polypropylene connection profiles of the “ ActiveBlock ” formwork elements . Propping is necessary against wind pressure, scaffold overload and horizontal forces that appear during pouring.

The EBT ActiveBlock propping system for the wall is assembled after the fourth course of elements has been placed as follows:

- 1) *See drawing # 15* for measurements
- 2) Attach the vertical profile to the vertical connection profile, using 10-inch wood screws at a distance of 40 cm center to center.
- 3) Secure the bottom of the vertical profile to the ground using 10-inch concrete nails or wood screws.
- 4) Fasten the diagonal support to the vertical profile by means of 10 mm fixing dowels .
- 5) Fix the diagonal support to the floor by means of 450 mm injection nails or to the intermediate floor with 10-inch wood screws.
- 6) Level the wall with the help of the tie bolt located on the diagonal support.

14) Placement of scaffolding

For scaffolding up to 230 cm high,

For taller scaffolds,

Place two scaffolding plates next to each other on the scaffold supports regardless of the height of the scaffold.

For heights greater than 230 cm, a double railing must be installed, for which the safety supports for scaffolding from the company ActiveBlock can be used . Also place a continuous vertical edge that protrudes at least 10 cm above the scaffolding plates.

15) Installation steps

Installation passages (for example electricity, water supply, air supply and exhaust, etc.) can easily be introduced by drilling holes in the elements with a saw, placing the desired pipes in them. If holes larger than 40 cm are needed, introduce reinforcements such as those for openings for doors and windows.

16) Preparations for concrete pouring

ActiveBlock ” formwork elements , the verticality of the installed wall must be checked and any necessary measurements introduced by means of tie-rods located in the uprights of the walls.

Practice has shown that it is useful to tie the upper course to the lower one by means of wire. This prevents the movement of the upper course when it receives a blow during the pouring of the concrete.

The uppermost course deserves special attention if the “ ActiveBlock ” construction system is going to be used for greater heights in the work. The upper part of the “ ActiveBlock ” element that provides the connection for the next course must be protected from dirt with concrete. Cover the top with a band of 6 mil- poly film , tied tightly. Remove the poly after pouring the concrete. This simplifies the later use of the “ ActiveBlock ” elements.

17) The pouring of concrete

ActiveBlock ” wall must be done in accordance with VBC 1990.

ActiveBlock ” formwork elements has many variables that must be taken into account before pouring begins. (For example, the linear length of the wall, temperature, compactness of the concrete mass, height of the wall and content of the element.) Otherwise, the speed of pouring will depend on the method used for filling.

Because the pouring of the concrete can cause an uneven distribution, adjustments in the concrete mass may be necessary.

18) Concrete pouring methods

- ◆ concrete pump
- ◆ bucket crane
- ◆ Conveyer belt
- ◆ Straight from the truck mixer

19) Filling the elements

Elements must be filled with a maximum of 122 cm per hour. Start the pour by filling the elements through the holes in the windows to get a good filling; close these openings and continue with the remaining elements.

20) Compaction of concrete

Each course must be compacted very well so that the reinforcement and the connection profiles are well tied. This also prevents gravel deposits. In addition, the next course must be compacted very well with the previous one, to avoid concreting joints.

The compaction of the concrete can be done in the following way :

- a) with bar
- b) Formwork vibration
- c) vibrating needle

During use it has been shown that the “ ActiveBlock ” reinforced walls of one storey 254 cm can be vibrated. The recommended diameter for the vibrating needle is about 25 mm. Experience has shown that larger vibrating needles can get stuck in the connection profiles in the armatures and that they can also cause unwanted extra pressures.

21) Settings

After filling the elements, the verticality of the walls must be checked and possible modifications made.

22) Removal of the struts

The removal of the props can be done after the concrete has acquired sufficient resistance and the supports are represented by the ground, roof or similar.

III. CONCRETE

Specifications

The nature of the concrete used in a construction project is determined by the requirements of the building and its environment. A good concrete, suitable for the use of the construction system of the company ActiveBlock must meet the requirements of the VBC 1990.

The use of a 150 mm funnel is recommended for filling.

For special applications concrete mixes can be used.

IV. SPECIAL APPLICATIONS

1. Stepped foundation

When a stepped foundation is necessary, it is recommended to choose vertical sections of 42.5 cm to avoid unnecessary cutting of elements

2. Forged on sand

The construction of a slab on sand is possible with the construction system " ActiveBlock "

3. Corner out of square

ActiveBlock variable element, corners of 15° up to 180° can be made by cutting the element with a carpenter's hand saw. For a good connection between successive courses, a minimum displacement of 40 cm is necessary.

4. Cross walls

Cross walls can be made simply and easily with " ActiveBlock " formwork elements and a carpenter's hand saw.

5. Wall completion

Vertical ending walls can easily be built by means of " ActiveBlock " end pieces (caps) . After each course of " ActiveBlock " elements is cut to the desired length, an end piece is added to the end of the horizontal course. The vertical notches on the inside face of the element offer a good hold for the final element.

6. Connections to floor systems

ActiveBlock ” construction system is a multiple formwork system that can be well adapted to different floor systems.

- 1) floor on plasterboard
- 2) Floor beam integrated into the wall
- 3) “ hambro ” type floor (to be designed)
- 4) Concrete plate on the ground built on a steel base (to be designed)
- 5) Grooved plate floor (to be designed)

7. Wall on a wooden base

ActiveBlock ” construction system can be used for the construction of walls on a wooden base. The propping system that is used to support the part of the wall that is on this wooden base must be designed for each project. Contact your ActiveBlock technical supplier for suggestions for individual projects.

8. Finishing of the main façade

When a facade with a pointed or curved finish appears in the design, it is necessary to place the elements up to above the height of the ceiling. This can be done by cutting elements at the desired slope and filling with drier concrete.

9. Deck anchor

Roof anchoring is done according to traditional construction methods.

- 1) Pre-fabricated deck plates
- 2) Flat roof with (*to be designed*)

V. MECHANICAL INSTALLATIONS

1) Electricity

All electricity cables and switches must be located according to the regulations established by the corresponding organizations.

Practice has shown that holes for electrical conduits, manholes and the like can be made quickly and well to the desired depth with the aid of a hot knife, milling cutter or the like. A switch box or switch box can be inserted and held in place by fastening to connecting profiles or by screwing into concrete. After all inspections have taken place, these gaps can be filled with polyurethane foam, thus keeping the pipes in place.

2) Plumbing works

Pipes and materials up to 38 mm can be introduced into the “ ActiveBlock ” wall system . Here, too, holes of the desired depth can be introduced. When larger measurements are required, they must be introduced before the concrete is poured. It is recommended not to place water pipes on the exterior walls.

3) Remaining mechanical installations

See chapter 2.7. Steps for installations.

VI. MOISTURE AND AIR INSULATION

a) Thermal insulation

ActiveBlock " construction system is used to separate a heated space from a non-heated one, it is not necessary to provide the EPS thermal insulation with moisture insulation, if there is continuous contact with the concrete.

The construction system of the ActiveBlock company obtained the approval based on the article

9.25.6.3. (1) of the Canadian National Building Code.

The EPS foam insulation used in the " ActiveBlock " construction system is type II, with a water permeability of less than 230 ng/ Pa s m. (*See the BASF instructions attached to the technical data*)

Condensation occurs when warm moist air comes into contact with a surface whose temperature is below the dew point. (The dew point is the temperature where water in the air will condense, based on ambient temperature and relative humidity) By design, the interior surface temperature of an ActiveBlock wall is close to the ambient temperature of the room. This is due to the great value of thermal insulation (Rc 3.2). On the contrary, windows have a lower insulation capacity and therefore the temperature on the inside is closer to that of the outside air. Here condensation occurs. For example:

With a planned indoor temperature of 24°C in winter and a relative humidity of 40%, the wall surface temperature would have to be 9°C for condensation to appear. In other words, the surface of the wall should be 15°C less than the room temperature.

b) Acoustic insulation

Thanks to its design, the walls built with the " ActiveBlock " system from the company EBT have a monolithic concrete core of 16 cm (normal block) or 12.5 cm (cheaper block) this solid mass does not allow air infiltration inward or outward. For this reason, these walls serve as air insulators as indicated in NBC 9.25.3.4.

VII. VAPOR / WATER BARRIER

A. Vapor barrier

A.1 Surface preparations

The working method to create a moisture barrier in an “ActiveBlock” wall is identical to that of a conventional concrete wall. The wall is battered from the bottom to a minimum of 30.5 cm below level 0. Then all the joints are battered in the same way as in a conventional wall.

A.2 Introduction of a vapor barrier

ActiveBlock” walls are prepared as described above and have been allowed to dry for a minimum of one night. The tar emulsion (water-based) can be applied directly on the batter and the EPS, from level 0 to the bottom of the foundation. The tar can be applied with a brush, roll or by injection.

A.3 Water barrier

Various water repellent products are available. Probably the easiest to use is the “Peel” and “Snag” variant.

ActiveBlock” construction system makes use of a “Peel and Stick” layer that can be applied in the same way as wallpapering a wall.

The waterproof sheet is laid in vertical bands 915 mm wide. The vertical connection is achieved by means of a minimum overlap of 64 mm. The sheet is provided with a mark to indicate the desired overlap.

Applying a band of fibrous cloth over the top of the sheet creates a gutter that evacuates water over the edge and prevents seepage behind the sheet.

VIII. INTERIOR FINISHES

1) Plasterboard

The most common finish is plasterboard. These can be easily and directly attached to the “ActiveBlock” wall by means of screws or nails into the plastic connection profiles, or by glue. There is NO NEED for insulation from air or moisture (*See chapter 6.1 - Insulation from moisture and 6.2 - Insulation from air*)

2) Stucco work

Stucco can be applied on the inside of an “ActiveBlock” wall in the same way as on the outside. A base layer made of a thin layer “Prep-coat B2000”, fibrous fabric introduced into the batter layer and a second thin layer “Prep-coat B2000”. The stucco color coat is applied over the base coat.

3) Coating

The interior coating can be applied in the traditional way. It is recommended to fasten the cladding to the “ActiveBlock” wall by means of screw nails in the plastic connection profiles. When using glues, it is recommended to first test a sample to see if this glue is compatible with EPS.

IX. EXTERIOR FINISH

A. Below level 0

A.1 Batter

Battering is generally done with a paddle. It is quick and easy to perform in two steps. The first step is the application of a thin layer of “Prep-coat 2000”. When this layer is still wet, the fibrous cloth is applied and with a trowel it is introduced into the “Prep-coat B2000” layer. This part can be dried while continuing with the remaining surface. When the area is dry, a second coat of “Prep-coat B2000” is applied. After re-drying, the surface is ready for stucco/paint application, or can be left as is.

B. Above level 0

B.1 Stucco work

The stucco is very easy to apply on an “ ActiveBlock ” wall. It is done in two phases using the same base as in the batter. The second step is the application of the topcoat with a trowel, injection or roller, whereby different patterns can be achieved.

C. Brick work

There are two methods to finish the “ ActiveBlock ” wall with brick work. The first is by making use of a conical formwork element as the top layer of the foundation. This element widens upwards to a width of 25 cm on the inside of the element, thus achieving a wider concrete ridge for masonry work, the necessary air chamber for this and the 50-cm wall plate. x 150 mm that is placed on top.

The second method makes use of a brick work while the construction of “ ActiveBlock ” walls for the upper floors continues. At the appropriate height on the wall (mainly above level 0) a row of “ ActiveBlock ” trestle elements is placed. This creates a 10 cm ridge of support for the stones and for the necessary air chamber and offers the possibility of continuing with more “ ActiveBlock ” wall plans . This system is designed to support 5,285 m of brick work.

D. Coating

The lining can be made of different materials. Each of them can be applied to the “ ActiveBlock ” wall.

D.1 Landscape

Horizontal lining can be done in the conventional way. Experience shows that galvanized decking nails can be made to fit vinyl or aluminum siding. Wood siding can be laid in the conventional manner.

D.2 Upright

Vertical cladding can be fastened by means of clamping bands that are applied to the connection profiles on the outside of the wall. The liner can then be attached to the clamping bands.

X. BUDGETS

The next chapter shows you a simple method of budgeting.

1. Measure the length of all walls (per story) that are built with the “ ActiveBlock ” formwork elements.
2. Count the number of octagonal and variable angles (separately)
3. Set the height of the walls of each space.
4. number of courses according to the height of the wall (one course is 42.5 cm high)
5. Divide the measured length of wall by the length of one element (122 cm) and multiply by the number of courses from step 4. This gives you the total number of elements needed for this story.
6. Then multiply the number of octagonal angles with the number of courses (from step 4). Do the same for the number of variable angles.
7. I deduct the number of angles (octagonal and variable) from the total elements (from step 5) This gives you the total standard elements needed. After this, you will know the number of standard, octagonal and variable elements.
8. The necessary reinforcement can be easily calculated when you know the number of elements and the position of the reinforcement in the wall (Various applications require different measurements and amounts of reinforcement)
9. For an estimate of the necessary material (tar emulsion, fibrous cloth and batter) multiply the length and height of the surfaces to be treated. Divide the result by 42 m² for the number of pails of tar; 42 m² for the number of rolls of fibrous cloth; 7 m² for the number of bags of mortar; and 22 m² for the number of rolls of waterproof sheeting.
10. The required amounts of concrete can be easily calculated by multiplying the total elements by 0.085 m³ (160 mm concrete core block) and 0.053 m³ (125 mm concrete core block).
11. When ordering the material it is recommended to establish a certain margin for waste, unforeseen events and mistakes.