

<b>CONSOLIS</b> <b>BETONIKA</b>	<b>INSTALLATION RECOMMENDATIONS FOR          PRECAST REINFORCED CONCRETE          PRODUCTION</b>	<b>EDITION 1          September          2008</b>
	<b>INSTALLATION OF STAIRWAY MEMBERS</b>	

## 1. General Part

There are several peculiarities to installation of pre-cast reinforced concrete landings and flight of stairs that are manufactured at the Company in comparison to installation of the old r/c structures. In the recommendations provided below, we intend to indicate to what a special attention should be drawn when installing these r/c members.

Typical installation assemblies of stair members and ways for their accomplishment are described in the Recommendation. Specific, rarely used assemblies and ways for their accomplishment should be indicated in each individual project. As stair members frequently are not subject to further finish (evacuation stairways), instead of standard lifting eyes they are manufactured with deepened sleeves into which lifting eyes are screwed. After the stair members have been installed, the eyes are screwed out while the deepened sleeves are filled with concrete.

## 2. Inspection of Production Items on Construction Site

All production items of the Company are marked by a special label meeting requirements of standards. In the label, the following information is provided: name of a production item and identification number, name of the client / object, identification number of the contract, geometric dimensions, the weight, manufacture date, a checking mark of the Quality Service.

It is recommended to verify quality of all transported production items prior to unloading and/or during it. When checking geometric dimensions of production items, drawings should be used and Tables of Production Tolerances enclosed to the contracts. When visually inspecting production items, it should be necessary to make sure that they do not have damage that may be caused by loading or transportation events. After the discrepancies or damage have been detected, the Construction Manager and Manufacturer's Representative (Project Manager) should be informed immediately. The Manufacturer shall assume obligation to take all necessary actions immediately to eliminate discrepancies, still claims concerning damage to production items shall be accepted only then when they are stated prior to unloading the production item from the transportation vehicle.

## 3. Unloading, Hoisting, Interim Storage

Landings and flights of stairs shall be unloaded from a transportation vehicle using four-branch stranded wire or chain strops, the lifting capacity of which corresponds to the weight of the production item. One should make sure that when lifting an item, the angle between strop branches is  $\leq 90^\circ$ .

Production items should be stored on a smooth, firm base, putting the supporting members in a manner allowing avoiding curvatures caused by the own weight of the item. Landings shall be stored putting the rest bars as near as possible to the planned resting part of the items. Flights of stairs shall be stored putting battens or boards along the production item at the distance 10÷15 cm from its sides. As the next flights of stairs shall be put on the steps of a lower flight of stairs, it shall be necessary to guarantee that during storage, the edges of steps would not break off. It is recommended to pile not more than six flights of stairs into a pile in order to guarantee that the edges of lower steps would not crack due to the weight of stairs (Fig. Nos. 1; 2).

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#### **4. Vertical (Planned) Positioning**



We recommend using four-branch chain type adjustable length strops or special installation belts of adjustable length for raising the flights of stairs. Prior to the raising a flight of stairs, one should make sure that installation eyes are screwed to the end, then the length of strops shall be adjusted in a way allowing hanging of the raised item in the exact planned position. A special attention should be paid to the fact that after improper adjustment of strop length, during installation the resting parts of stair members may be damaged (Fig. Nos. 3; 4).

#### **5. Installation, Adjustment, Temporary Positioning, Concreting**

Landings are installed on brick walls of stairways or into the grooves at the top of walls of prefabricated stairways, also on the support tables as earlier in the pre-cast r/c systems. First of all, at the resting points of landings (between floors as well), by the planned height of the bottom, the supporting blocks shall be placed. Then, into the gaps between the blocks, under the entire length of the supporting member of the landing, fine aggregate concrete grade C30/37 shall be laid, so that the item when being laid into the planned position will squeeze concrete surplus. Then gaps shall be concreted between the ends of landings, and also grooves in the wall. Another method for concreting the assemblies of landings shall be as follows: the formworks that seal slots at the ends of the landing are installed, then the assemblies are filled with self-leveling not shrinking mix Vetonit 600/3, or analogous mix of other manufacturer. When installing landings, a particular attention should be paid to the fact that adjustment of the production item into its planned position should be conducted after the item has not been fully lowered on the support blocks, the strops should still be stretched. Only after adjustment at proper distances from walls (distances are indicated in the Project), the landing may be freed, and its horizontality checked using a spirit level. Large installation breakers shall not be allowed to use (breaker's length up to 60cm). Otherwise, during adjustment, not only protective concrete layer may be broken off but also a part of bearing layer of concrete.

Resting parts of the prefabricated r/c flights of stairs are of quite small cross-section, and also a protective concrete layer is narrow. Therefore, their installation requires particular carefulness, thoroughness and accuracy. In the grooves of both the floor and landings between floors, the supporting blocks of proper height (by the altitude indicated in the Project or calculated) shall be placed. Then, into the gaps between the blocks, under the entire length of flight supporting member, fine aggregate concrete grade C30/37 shall be laid in a way allowing squeezing the surplus concrete by the item being laid. As in description in section 4, the hooked flight of stairs shall be carefully lowered into the planned position. One should pay attention to the fact that the member being installed should evenly lay on all four supporting blocks. If the flight of stairs is hooked at a wrong inclination angle, during lowering into the planned position, its one end will lay on the blocks faster, while the other end will remain suspended in the air. Such installation is prohibited, as surely the protective concrete layer will be broken off. The inclination angle should be adjusted using adjustable chains, strops or belts so that the flight of stairs will lean at the same time on all four supporting blocks, or a little earlier on the blocks of the landing that is underneath. In no way the production item should prop first against supporting blocks of the landing that is higher, as then the flight of stairs will not go into the grooves of landings intended for it. In this case, the risk exists that edges of the members will be broken off (Fig. Nos. 5; 7; 8).

The installed flight of stairs should be precisely adjusted (clearances are indicated in the Project) against landings and walls of the stairway. Adjustment work shall be conducted at the stretched lifting strops in order to push the item gently in proper direction, using a small breaker. It is not recommended to adjust the item after the lifting strops have been unhooked, and large installation breakers should not be used, as

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their use causes a considerable concentrated force that may damage members of stairs. After the flight of stairs has been adjusted, gaps between the members of stairs shall be filled with fine aggregate concrete or mix Vetonit 600/3.

In order to protect against breaking off the corners of stair members and the planes against holes during construction, they should be covered with blanks of wood chips or veneer.

## 6. Measures in Winter

When installing members of stairs in the winter time, it should be ensured that prior to installation, the snow and the ice is thoroughly cleaned off the production items and bearing surfaces as well. When concreting assemblies of junctions, the concrete should be with anti-freezing admixtures selected by the existing ambient air temperature. Prior to filling with mix, the place to be concreted occasionally may be required to be slightly heated using a gas burner or steam.

The concreted junction should be immediately covered with heat-insulating material (stone wool or special mats). In the case of extremely cold weather, during the initial setting of the concrete, the concreted place should be heated. For this purpose, around the concreted place, a case shall be made and hot air shall be blown into it.

As joints of installation assemblies of stair members are of quite small cross-section, it is recommended to perform their filling with mixes at the ambient air temperature not less than +5<sup>0</sup> C. Then, the probability of freezing the joint of the assembly being concreted by frozen members being installed will diminish.

## 7. Safety at Work

All Works of unloading, storage, installation should be organized on the basis of the following documents that regulate safety at work:

**DT8-00 “Safe Use of Elevating Machines Regulations“.**

**DT5-00 “Safety and Health in Construction Regulations“.**

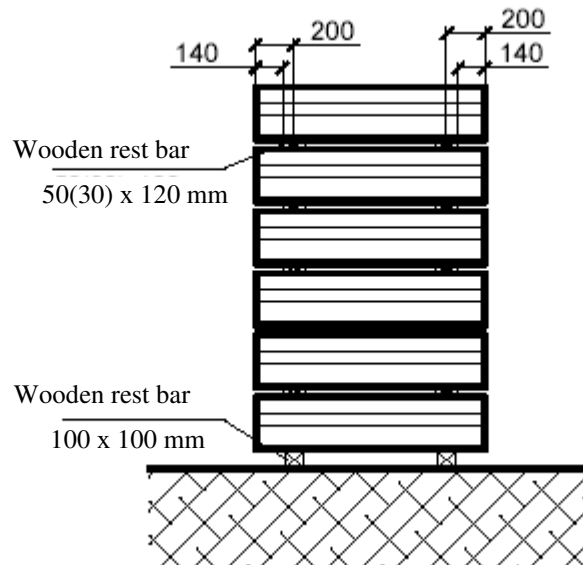
The workers that conduct installation of members of stairs should be having heard a course on instructions of safety at work for installers, they should have certificates of installers and hitchers and know all abovementioned items of the Recommendation. One should observe and ensure that strangers would not get on the territory of installation. Also, during installation everyone should wear personal protection means (belts, helmets etc.). To unload and hoist into the planned position, standard facilities should be used that correspond to the weight and overall dimensions of r/c members. After the members of stairs have been installed, it shall be necessary to erect temporary handrails and fencing of holes (Fig. No.6).

*The Recommendation has been prepared by UAB “BETONIKA“ according to recommendations of the concern “CONSOLIS“.*

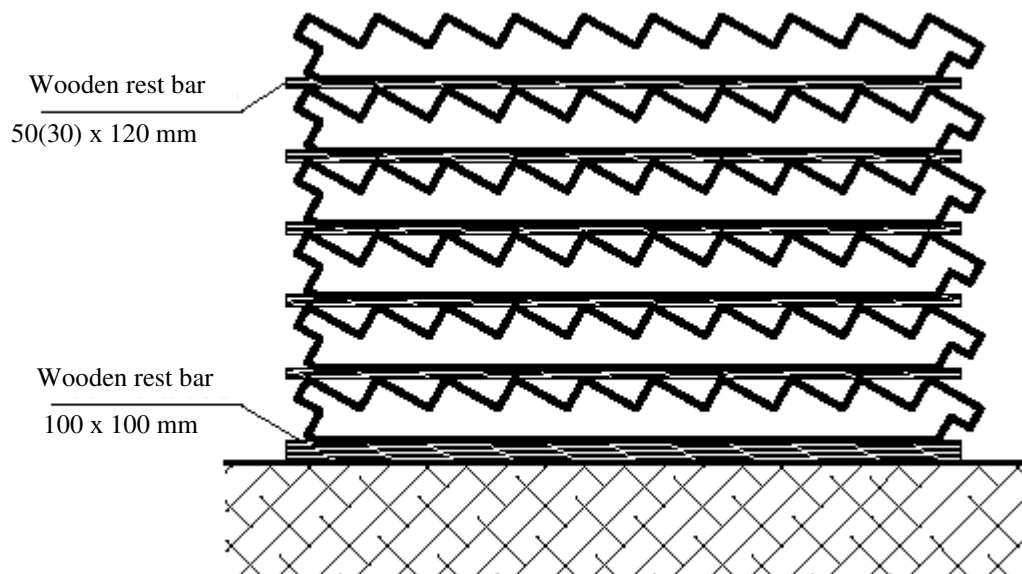
**INSTALLATION OF STAIRWAY MEMBERS**

**STORAGE SCHEME FOR FLIGHT OF STAIRS**

VIEW FROM THE END



VIEW FROM THE SIDE

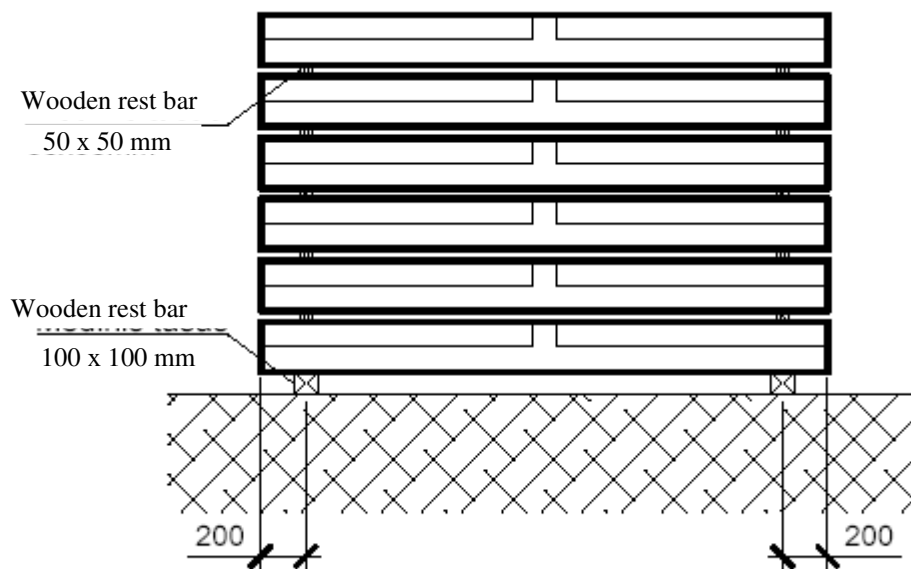


*Figure No.1*

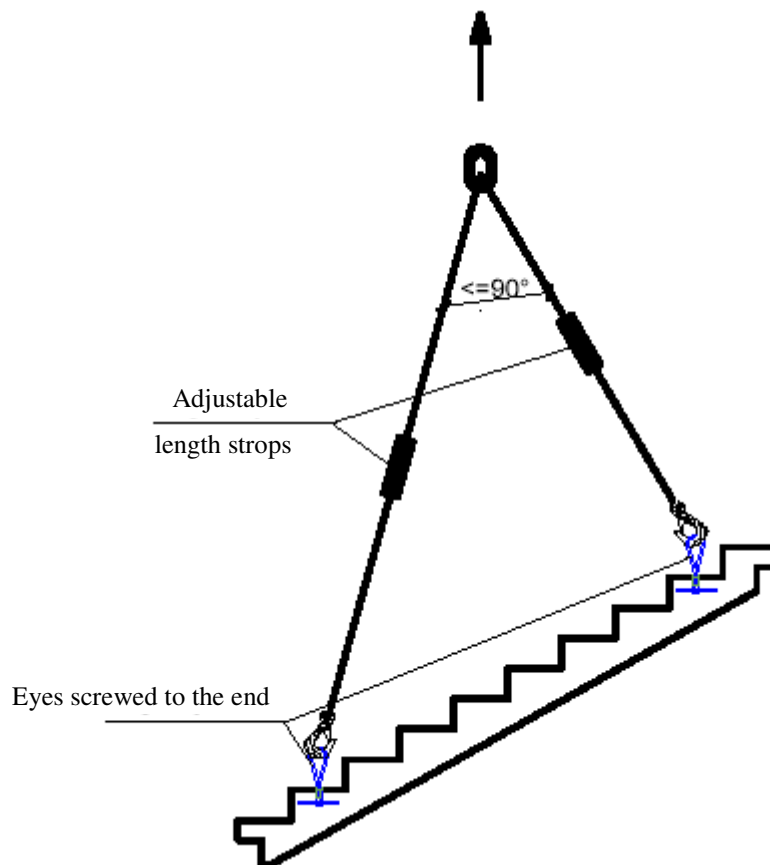
**INSTALLATION OF STAIRWAY MEMBERS**

**STORAGE SCHEME FOR LANDINGS**

VIEW FROM THE SIDE



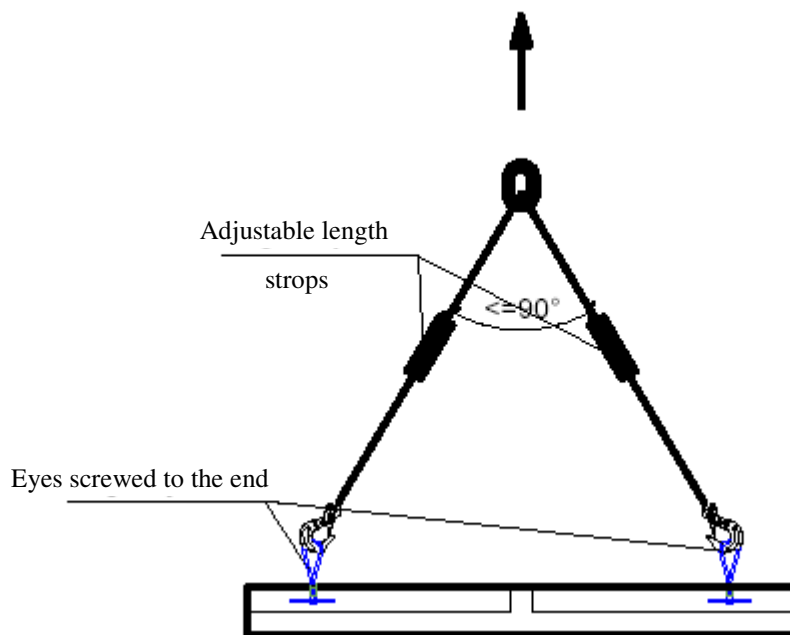
*Figure No.2*

**INSTALLATION OF STAIRWAY MEMBERS****STROPPING SCHEME FOR FLIGHTS OF STAIRS**

Note:

- 1) During lifting, all four-branch chain or belt type strops of adjustable length should be stretched.
- 2) When four branch strops are stretched, using a small (up to 0.6 m length) breaker, the member shall be directed and placed into planned position.

*Figure No.3*

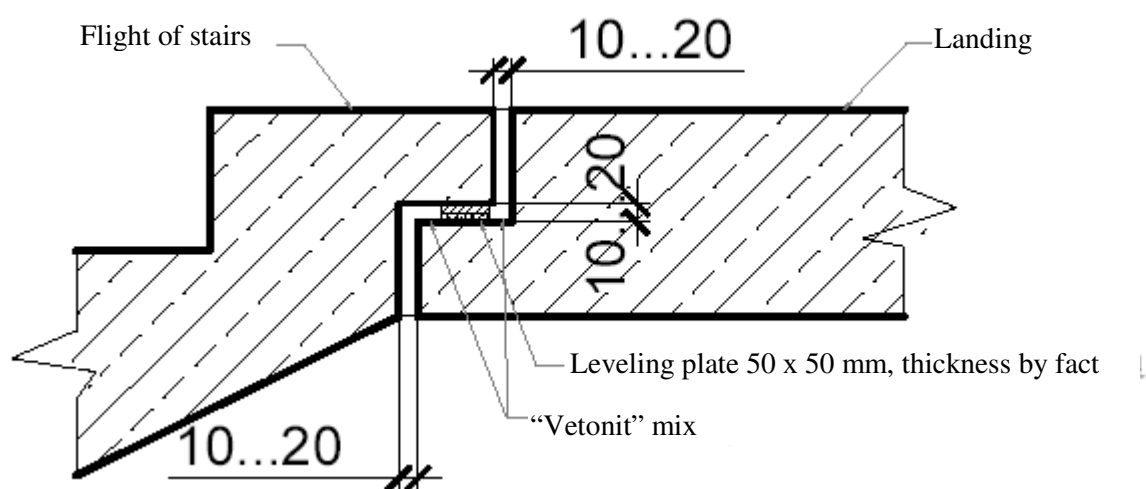
**INSTALLATION OF STAIRWAY MEMBERS****STROPPING SCHEME FOR LANDINGS****Note:**

- 1) During lifting, all four-branch chain or belt type strops of adjustable length should be stretched.
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*Figure No.4*

**INSTALLATION OF STAIRWAY MEMBERS**

**ASSEMBLY OF PROPPING THE FLIGHT OF STAIRS AGAINST THE LANDING**



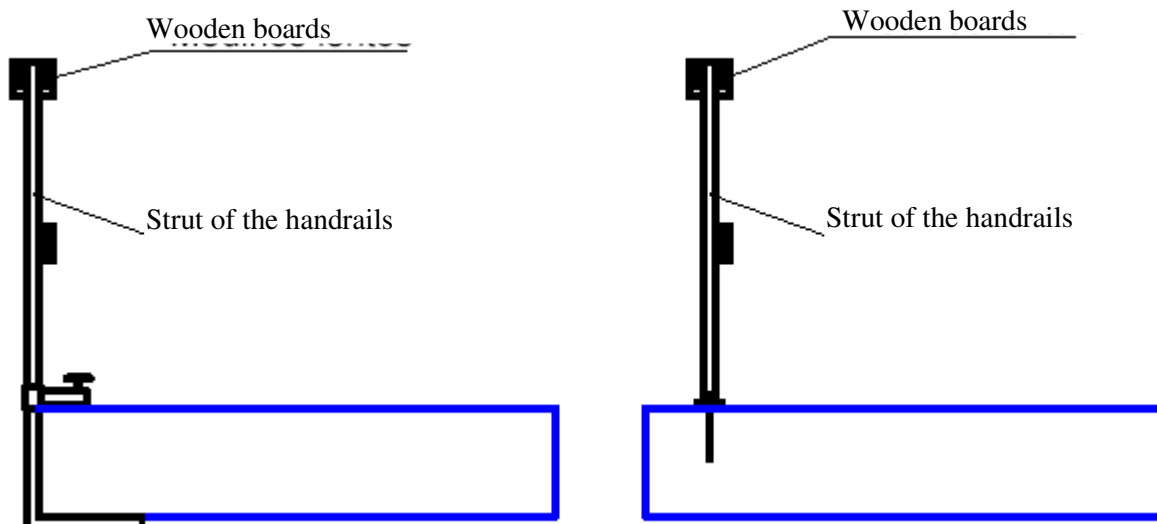
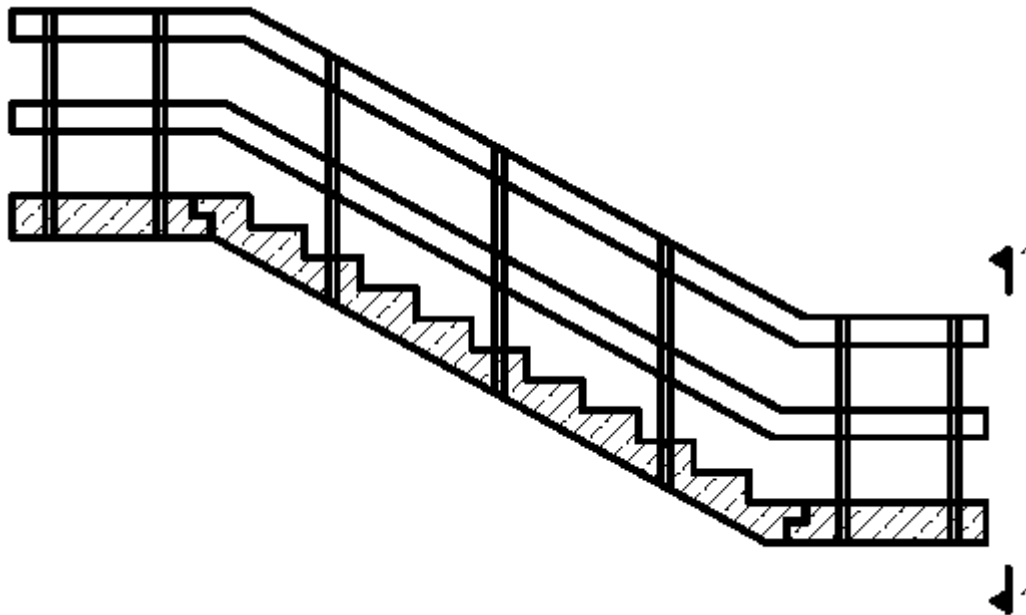
*Figure No.5*



**INSTALLATION OF STAIRWAY MEMBERS**

**INSTALLATION OF TEMPORARY HANDRAILS**

VIEW FROM THE SIDE



*Figure No.6*

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### Installation tolerances for landings

Gap between the resting-place and wall	$\pm 10$ mm
Difference in heights of adjacent slab lower part junction	8 mm
Height position on the support	$\pm 10$ mm

*Figure No.7*

### Installation tolerances for flights of stairs

Flight of stairs	
- longitudinal position	$\pm 20$ mm
- transverse position	$\pm 15$ mm
- height position	$\pm 7$ mm
- joint width	$\pm 5$ mm

*Figure No. 8*