

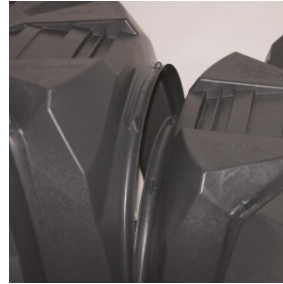
Technical Specifications | Creating Reinforced Concrete Raised Floors Using Disposable Formworks

Job description: Laying of disposable formworks made of regenerated polypropylene on floor slab, passing electrical as well as mechanical installations through the void space created by the formwork, creating access points to such installations, laying steel mesh on top of the disposable formwork, pouring concrete and thus creating a reinforced concrete raised floor.

'Disposable formworks' are concrete shaping formworks that are used only once and made of recycled plastic with a width and length of 71x71 cm where height changes every 5 cm depending on the requirements and each arch allows a cable tray to pass through. When laid next to each other they create a structure that doesn't leak concrete below, thus they create a void space under the topping concrete.

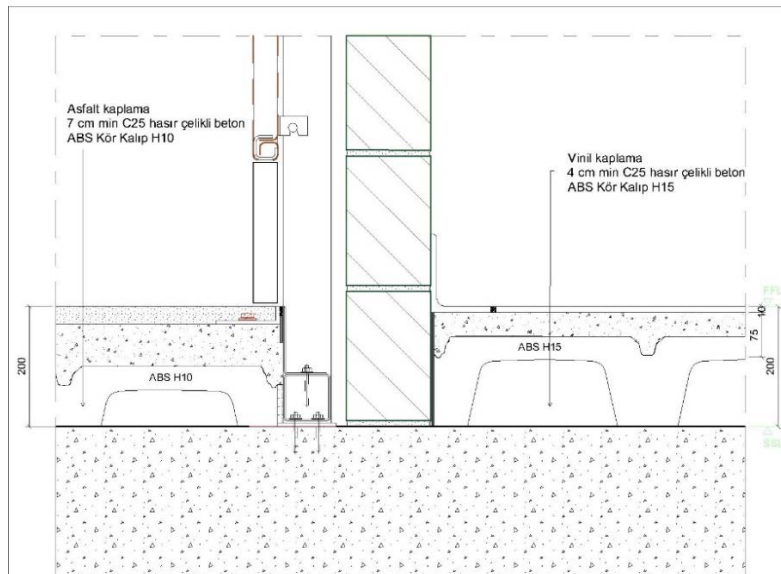


71x71 H5 cm



Male – female interconnection

Formworks are laid next to each other with their male-female parts interlocking each other thus creating a bidirectional structure ready to be filled with 300 dose concrete.



Sample Application Cross Section

The created void space under the formwork structure could be used for passing through electrical as well as mechanical installations.

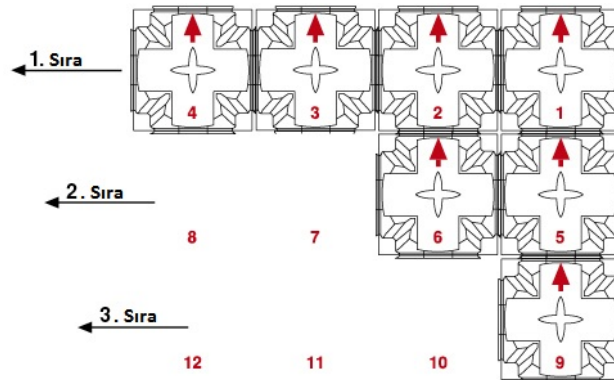
1. Surface preparation

Disposable formworks could be laid upon the floor slab directly. The surface has to be cleaned and any debris should be removed.

2. Installation

- 2.1. Disposable formworks are placed in rows from right to left and from top to bottom. The arrows on top of the formwork must always point away from the installer. Always check whether if the feet of

disposable formworks are joined correctly, otherwise feet may fold inward during casting and concrete may leak into the void space.



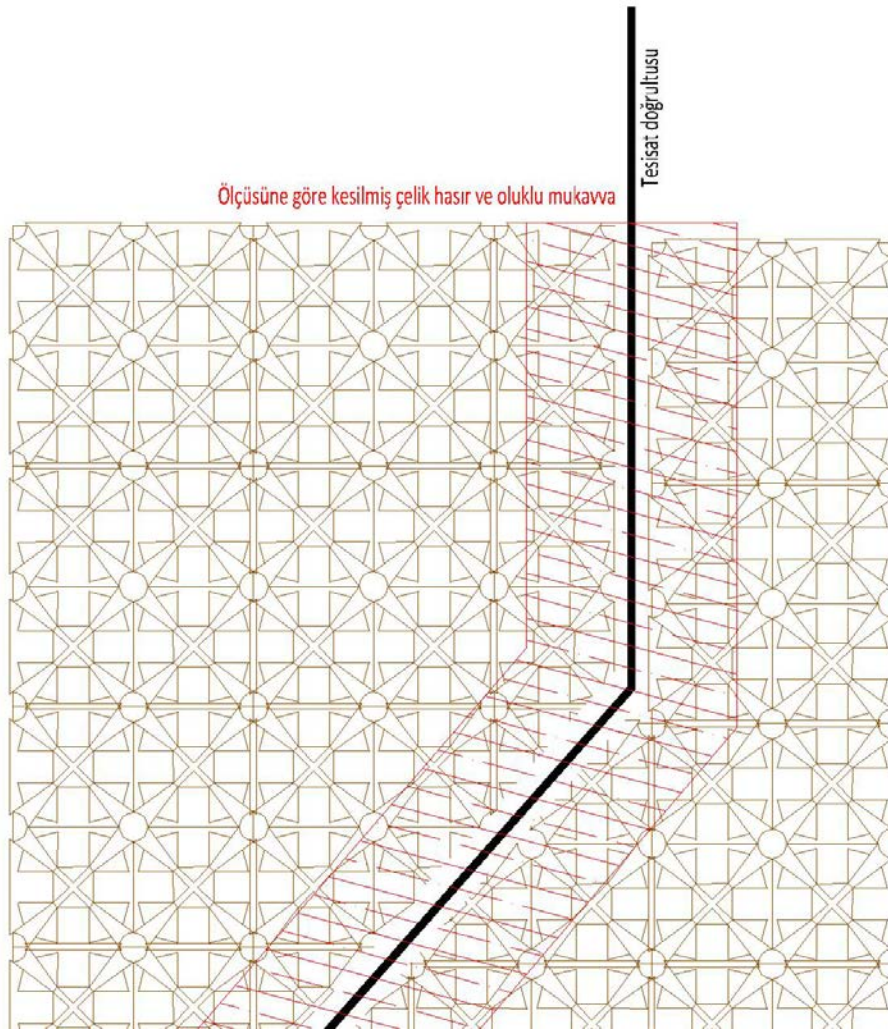
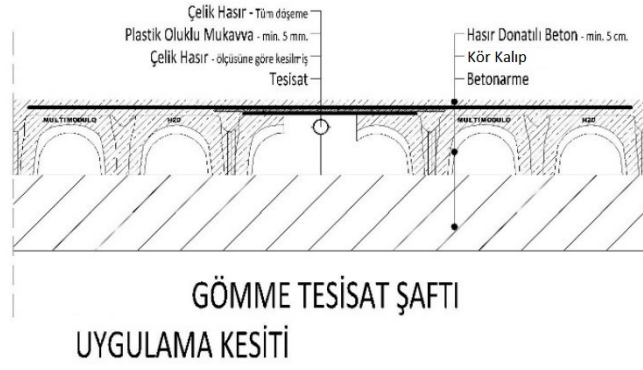
- 2.2. Disposable formworks must be closed tightly at all four sides with brick or concrete walls or conventional formwork to stabilize the formwork structure.
- 2.3. Formworks may be trimmed to fit in a specific size, however the trim should be done only through the feet, in order to have the domes supported by all four feet. The formwork has to be as near as possible to the surrounding separator wall. Any space left open between the formwork and separator wall should be filled with EPS (expanded polystyrene) pieces or polyurethane foam.
- 2.4. Before laying the steel mesh the formwork structure has to be checked for any holes or else concrete may leak.
- 2.5. Welded mesh of designated specs will be placed on top of the formworks.
- 2.6. As soon as a few pieces of formworks are installed it is possible to walk on the formworks stepping on the outer rim of the domes; operators should not tread in the center of the domes. Once the welded mesh is in place it is possible to walk over the whole surface.

3. Installation layout

- 3.1. If there is a planned electrical and/or mechanical installation in the concrete raised floor area;
 - 3.1.1. Such installments could be laid beforehand by measuring the distance from the starting point of the formworks. This way the installations may pass correctly through the arches without crossing the legs.



- 3.1.2. If the installations have to cross the legs or they have to pass diagonally to the formwork grid, then the formworks in that area should be cut out. Later, a steel mesh not wider than 20-30 cm could be laid on that area along with a plastic corrugated sheet of 5 mm thickness as cover. Where the plastic sheet touches the formwork should be sealed with polyurethane foam so that concrete does not penetrate the void space underneath. This way an embedded technical shaft could be created. Later, the regular steel mesh for the concrete raised floor should be laid on top of the plastic corrugated sheet.



- 3.1.3. If there is a need for accessing the installations regularly than a hybrid system should be considered; using both concrete and modular raised floors. In such case, the modular area should be boarded with wood panels. Once concrete is poured and the concrete raised floor is created the modular section could be laid in the open space adjacent to the concrete raised floor system.



- 3.1.4. If electrical boxes are used, they should be installed flush with the finished concrete leaving no empty space between the disposable formworks and the box. Any empty space should be filled with EPS or any other easy-to-remove material without hindering the void space underneath.



Any space between the electrical box and the formwork system has to be filled with an easy-to-remove material before pouring concrete



The electrical box should be flush with the concrete

- 3.2. If there isn't any planned electrical and/or mechanical installation in the concrete raised floor area, but if it could be in the future;
- 3.2.1. Empty junction boxes should be laid in both x and y directions every five meters creating a grid of such boxes. These boxes could be used to pass electrical and/or mechanical installations under the concrete raised floor when needed.
- 3.2.2. The connection between any two boxes could be made with a flexible cable guide driven from one box to the other.
- 3.2.3. If the junction box and the exit point of the installation is far apart then a whole could be drilled at the exit point and again with the help of a guide the installations could be brought to the exit location.
- 3.2.4. In order to leave a junction box space in the concrete raised floor, a regular XPS (extruded polystyrene) piece of 36x36 cm (or another appropriate size depending on the junction box that will be used) should be fixed on the disposable formwork using glue or simple screws. If a junction box grid system is going to be created as mentioned above, then a string guide should be fixed to ensure the correctness of the grid.



- 3.2.5. After concrete is poured the XPS pieces as well as the formwork section underneath it could be removed by cutting them out. This way the void space underneath the surface would be reachable. Any unused XPS pieces could be left over in the concrete and later covered with a surface material such as carpet, wood flooring etc. They will be strong enough to carry any regular light loads.



- 3.2.6. If an electrical box needs to be put in the junction box, then it could be fixed to the slab floor. This will lead to an empty space between the electrical box and the floor surface since they are of different sizes. This space could be covered with the galvanized steel frame of 1 mm thickness. For example; in an empty junction box space of 36x36 cm an electrical box will cover a space of 35x35 cm but the real box inside will be 32x32 cm. After the box is fixed there will be a space of 2 cm around all four sides of the box. To cover this space a 1 mm steel frame of 6 cm on one side is needed. The frame needs to be 40x40 cm outside and 28x28 cm inside. It will lay 2 cm on one side of the box, 2 cm on the concrete floor, covering the 2 cm empty space.



- 3.2.7. If the junction box needs to be used only to pass through installations, then XPS and formwork should be removed as explained above. Once the installations pass through then the box opening could be covered with a 1 mm steel sheet that has a steel support leg in the middle to hinder deformations.



4. Concrete pouring

- 4.1. For regular office use a 300-dose dry concrete is enough to carry the loads, but for any heavier loads a minimum of C25 class S3 slump concrete is needed. The steel mesh should be covered by concrete up to the height needed to carry on the loads on the surface.



- 4.2. During casting the concrete hose should never be higher than 20 cm above formworks or else the pressure may displace formworks.
- 4.3. Once the concrete is poured the surface should be leveled using a flat guide and/or a helicopter as needs to be done in any concrete surface treatment.
- 4.4. In 24 – 48 hours after the concrete is poured depending on thickness, a minimum of 1/5 and a maximum of 1/3, of the top concrete should be cut by a concrete saw creating a grid of joints in order to prevent surface shatter cracks.

General: Formworks should not emit pollutants; the producer must have achieved ISO 9001. The technical and managerial staff of the producer must be well equipped to provide solution for any question raised by project managers and job site representatives.

All manuals, installation schemes and if necessary, technical support must be included in the price.