

RULES FOR THE CORRECT USE OF FORMWORK WITH 3-PLY WOOD PANELS, BRACKETS AND SPACERS



The CE European standard (previously DIN) distinguish the formwork into following classes:

class “A” formwork, maximum pressure $\leq 60 \text{ kN/m}^2$

class “B” formwork, maximum pressure $\leq 40 \text{ kN/m}^2$

Our formwork system using 3-ply wood panels, profiles and spacers as well as our column formwork system are designed accordance with class “B”, i.e. formwork designed to resist a maximum pressure of 40 kN/m^2 .

This pressure corresponds to a liquid column of concrete 160 cm high. (concrete mass $25 \text{ kN/m}^3 \times 1,60 \text{ m high} = 40 \text{ kN/m}^2$)

Consequently inside the formwork the height of the liquid concrete must never exceed 160 cm.

The height of this liquid concrete column depends on several factors. The main are:

1. The time in which the used concrete for that casting start to solidify;

2. The vertical pouring filling speed inside the formwork

First of all point 1 must be defined so the time in which the used concrete for the casting start to solidify.

This time is in relation with the type of concrete and its fluidity (Class F1-F2-F3-F4-F5-F6).

Furthermore, this time is influenced by the ambient temperature: the colder it is, the longer is the time.

According to the DIN 100: 2010-.37.2, the concrete supplier is required to communicate this important information.

To detect the fluidity and the time the concrete start to solidify, the concrete supplier can carry out tests using the Abrams cone (see picture at side)

Based on how much the top of the cone lowers over time, the fluidity of the concrete and the relative setting time are calculated.



Once the solidification time is established, it is possible to calculate the maximum filling speed at which the formwork can be filled.

As an example, considering the solidification time as 3 hours and the maximum height of the liquid column of concrete inside the formwork not higher than 160 cm, we can calculate that the maximum filling speed of the formwork is 53 cm/hour .

In a formwork 50 m long and 30 cm wide, the entire content of a concrete mixer truck of 8 cubic meter poured in the formwork, fills a height of 53 cm.

This means that it is possible to pour one concrete mixer truck every hour.

Small formworks, that require not too much concrete to fulfil, are the most sensitive. It is a must to keep under control the maximum filling speed as it is very easy to overcome it.
Small and tall formworks are the most dangerous to pour into them.

The column formworks must be poured partially one by one not exceeding the maximum permitted height (cm.160). Elapsed the necessary time, it is possible to re-start the concrete pouring starting from the first column. The maximum distance between brackets on the column formwork is showed on our flyers.

While realizing wall formworks using 3-ply wood panels, profiles and spacers, it is mandatory to work according to the follow indication:

- DO NOT use spacers coming from different producers;
- All spacers have to be of the same exact length, so that the pressure is distributed between them evenly;
- For the same above reason, even the vertical profiles need to be of the same exact length as well as from the same producer;
- Before to start to pour the concrete verify carefully the correct connection between profiles and wedges;
- The pour need to be slow, especially at the base of the formwork;
- The concrete need to be pour with an inclined plane in order to deposit it gently just above the fill level;
- Respect the maximum allowed vertical pouring speed.

When placing the steel spacers during the assembly of the formwork, the following instructions must be followed.

Using panels 50 cm wide and of any length, the first and the last spacer have to be placed at least 10 cm from the panel edges.

The intermediate spacers must have a maximum distance between each other NOT exceeding 40 cm.

As an example, using a panel 2,00x0,50 m (200 cm length), positioning the first and the last spacer 10 cm from the edges, we have got an internal remaining space of 180 cm.

In this case 4 more spacers have to be placed along the panel (a total of 6 spacers).

Working on this way the maximum distance between spacers will be 36 cm, so it is not exceeding the 40 cm mentioned above.

By respecting the aforementioned parameters of maximum filling speed and distance between spacers, it is possible to realize any formwork height.

All components produced by our company have got a safety factor of 1,7.

This means that our components eventually break with an effort equal to 1.7 times that allowed.

Furthermore, the steel we use to produce our spacers has a tensile strength 10-15% higher than the guaranteed minimum of 800 MPA (N/mm²)

This large safety margin often allows construction companies, who want to speed up casting times, not to comply with the prescribed standards. This produce bad working habits and is a risky behavior, because, if the prescribed rules are not correctly respected, a few small unexpected events will be enough to cause the formwork to break.

In conclusion, we strongly recommend the user to faithfully follow all the instructions provided.