alkus plastic sheets

Technical Instruction Manual
Panel facing without swelling or shrinkage
How often is it happening that plywood is already penetrated by moisture after only a few applications? This leads to changes in dimensions and the bearing capacity can sometimes drop by more than 50%.
With the alkus-sheet there is no swelling and shrinkage - once and for all. As no water can penetrate the panel, there are no changes due to moisture. Neither to the geometry nor to the mechanical values. Of course, there is also no decay due to rotting.

Nail-holding as plywood
The alkus-sheet is nailable as plywood; however, there is no chipping off of the face veneer and no risk of being destroyed by mold. Of course, the nail pull-out strength has been confirmed by comparative tests with plywood.

Simple repair
The alkus-sheet is repaired with the same plastic material as the upper layer consists of. This increases the quality of the repair and extends the life span of the panels.

Favorable eco-balance
The plastic surface of the alkus sheet does not enter into a chemical reaction with concrete and the cleaning effort is reduced to a minimum.
Last but not least: old and used up alkus-sheets can be recycled into identical products, without consumption of timber resources.

Use of self-compacting concrete
The technology institute "Heidelberger Technologie Center HTC" highly recommends the use of solvent-based release agent when using special or self-compacting concrete.

If the special concrete has a retarded setting by using fly ash, the stripping time is extended. If this extension is not observed and the formwork is stripped too early, the top concrete layer might adhere to the facing, because the concrete strength at the surface is still too less.

Extremely long life span
The sum total of advantages:

• no destruction due to moisture
• no chipping off of face veneer during nailing
• no decay due to mold
• repair with the same plastic material as the upper layer results in a life span of the alkus-sheet as long as the life span of the frame.

Acceptance for return
MEVA guarantees the acceptance of returned alkus-sheets, worldwide.

June 2010
Development of the flexural modulus of elasticity during the different project stages from July 1992 to the current panel structure.

Please note:
The technical manual contains information, instructions and hints how to use the alkus-sheets and the related tools. When using our products, the federal, state and local codes and regulations must be observed. What is shown on the following pages are assembly sketches for demonstration purposes. To display details more clearly, safety factor aspects are not always included. Most examples shown are standard applications as they occur in practice most frequently. In case of problems or special cases not dealt with in this manual, please contact the MEVA experts for advice.

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Features

The crucial feature of the alkus-sheet is the fact that no moisture can penetrate the sheet, and therefore there is no swelling and no shrinkage. Surface damage (nailing, screwing, sawing, etc.) does not result in destruction or decay caused by water, and consequently there is no decrease in bearing capacity during the whole life span.

**Improved concrete surface**
Until now, the swelling of the plywood facing required the frame profile to project past the plywood face. This resulted in the profile nose leaving a mark in the concrete. With the alkus-sheet this is no longer a concern as thickness growth due to moisture is a thing of the past (Fig. 4.1 - Fig. 4.3).

**Hints on nailing**
We recommend hammering the plastic mass projecting around the nail holes after the nails have been pulled out with a hammer (Fig. 4.4). This flattens the surface again, and no water or slurry can leak through the holes while pouring. Penetrating water (e.g. rain or cleaning from the other side) is no problem for the alkus-sheets and does not harm or damage them.

**Increased flexural stiffness by thicker sheets**
As the profile noses of the formwork panels need to have a projection to compensate for the swelling of the plywood, the alkus-sheets can be built in approx. 5/64" (2 mm) thicker, since they do not increase in thickness. This means, that the flexural stiffness $E \times I$ (modulus of elasticity $x$ moment of inertia) improves by 37 % for a 0.79" (20 mm) alkus-sheet compared to 0.71" (18 mm) plywood.
Effects of water-soluble release agent
Especially water-based release agent emulsions have a tendency to drip off and not to form a film coating. If water-soluble release agent is applied the film coating at the upper edge of the formwork might be washed away if concrete is poured by using a bucket. As there is no film coating left, concrete will adhere to the formwork.

How to use solvent-based release agent
As the alkus-sheets absorb neither water nor lubricant, there is no need to oil the sheets after stripping. As experience shows, a treatment before every application is recommended. Besides treating the frames, it is required to spray the alkus faces immediately before assembling (Fig. 5.2). MEVA suggests the use of a solvent-based release agent. Make sure not to spray too much of the release agent, since a thick separating layer tends to be sticky. The additional use of release agent is determined by jobsite conditions.

Application of a stainless steel jet
The release agent must be sprayed only in thin layers, so that the solvent can evaporate immediately and only a very thin film coating remains. Therefore, it is recommended to use a stainless steel jet, which produces a steady fine mist (Fig. 5.1).

Wax
A fluid wax is recommended for all types of formwork. It is either sprayed or applied evenly with a brush or a sponge to those parts of the formwork that will not get into contact with concrete. We suggest to spray the panel stacks (wall and slab forms) all around (Fig. 5.3 - Fig. 5.4). As ever, the facing should be sprayed with release agent, since any wax remnants on the concrete might lead to problems with finishing works.

<table>
<thead>
<tr>
<th>Description</th>
<th>Ref.-No.</th>
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<tbody>
<tr>
<td>Stainless steel jet</td>
<td>29-203-94</td>
</tr>
<tr>
<td>Sprayer</td>
<td>29-903-70</td>
</tr>
<tr>
<td>Wax</td>
<td>29-203-95</td>
</tr>
</tbody>
</table>
Repair of scratches
Coarse damages or single deep scratches are repaired with the same plastic material as the upper layer of the alkus-sheet consists of: Polypropylene. The result is a high-quality surface ready for the next application (Fig. 6.1).

Repair with patches
Surface damages caused by vibrators or reinforcement are repaired with plastic patches with a diameter of 2" (5 cm) (Fig. 6.4).
The maximum area of surface damages to be repaired can be the size of a hand. For this, several patches are put in a row.

Repair procedure
Use the hot air welder to preheat the thermoplastic material at the damaged spot. In case of scratches fill the damaged area with the heated polypropylene welding rod (Fig. 6.1). A commercial paint remover is used to grind off protruding parts (Fig. 6.3). Drill holes and greater damages are drilled thoroughly and filled with plastic patches. Drill holes and other holes up to a diameter of 1" (2.5 cm) are repaired with a plastic plug (Fig. 6.2).

In case of greater damage a complete section of an alkus sheet is welded between two cross stiffeners of a wall or slab form panel.

alkus-repair set
For the repair of the alkus-sheets a complete repair set is available. Nevertheless, all tools can be ordered separately (Fig. 6.5).

Description Ref.-No.
alkus-repair set........ 29-912-00
Aluminum box (without contents) 28-100-10
Hot air welder........... 29-912-10
Quick clamping welding nozzle ........... 29-912-15
Metabo paint remover........... 29-912-20
Spare knives for Metabo paint remover........... 29-912-22
Drilling machine........ 29-912-30
Stand for drilling machine........... 29-912-35
Special step drill bit........ 29-912-50
Carbide cylinder head drill bit........ 29-912-55
Scraper........... 29-912-70
Side cutting pliers........ 29-912-75
Depth gauge (6mm)........ 29-912-80
Welding rod, PP 20 m (65')........ 29-912-95
Repair plug 23........ 29-913-10
Repair plug 20........ 29-913-15
Repair plug 17........ 29-913-20
Repair patch D 35........ 29-913-25
Repair patch 2"........ 29-913-30
AS-conical tube D29/24........ 42-010-16
Cleaning and replacement

Cleaning after stripping
In principle, cleaning should not be carried out with hard and scratching metallic devices, like scrapers with hard metal blades (Fig. 7.1).

Manual cleaning
Spatulas, a piece of hardwood or a wet cloth are sufficient to remove concrete remnants from the alkus.

Rotation cleaner
Make sure to attach only a plastic pad to the rotary disc so that the alkus-sheet will not be damaged. We recommend to use water plus sawdust (Fig. 7.2).

High pressure cleaning
The most effective way to clean the panels is with a high pressure cleaner. The water consumption for this is extremely little. You can also use this steam jet to hose down the formwork after pouring (Fig. 7.3).

Professional cleaning
If using a professional cleaning machine, make sure to use only appropriate plastic brushes.

Replacement of plywood
MEVA offers the new and durable alkus-sheets for modular forms of all common brands. The new plastic sheets have the same life span as the frame.

Hints on replacement
Temperature effects might cause that the aluminum layer of the alkus-sheet shears off the screw heads. Therefore, the drill hole should be 3/64" (1 mm) more in diameter than the diameter of the screw (Fig. 7.4).

<table>
<thead>
<tr>
<th>Description</th>
<th>Ref.-No.</th>
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<tbody>
<tr>
<td>Cleaning grid</td>
<td>28-502-35</td>
</tr>
<tr>
<td>Cleaning pad</td>
<td>28-502-30</td>
</tr>
</tbody>
</table>

Fig. 7.1

Fig. 7.2

Fig. 7.3

Fig. 7.4
Already during the design stage of the alkus, the hundred percent recyclability was among the indispensable requirements. The diagram on the right explains how old and used panels are recycled into identical products with the alkus recycling concept. This means a hundred percent recycling. MEVA guarantees the acceptance of returned alkus-sheets, worldwide.

Recycling concept
### Technical data

<table>
<thead>
<tr>
<th>Reinforcing Layer</th>
<th>Glass Fibers</th>
<th>Aluminum</th>
<th>Test-Standard</th>
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<tbody>
<tr>
<td>Type of Panel</td>
<td>GM 6</td>
<td>GM 10</td>
<td>GM 12</td>
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<tr>
<td>Reference Thickness (mm)</td>
<td>5.7 10.0 11.5</td>
<td>13.0 15.0 17.0 20.0 21.0 23.0</td>
<td></td>
</tr>
<tr>
<td>Thickness Tolerance / Deviation (mm)</td>
<td>+0/-0.6</td>
<td>+0/-0.6</td>
<td></td>
</tr>
<tr>
<td>Density (kg/m³)</td>
<td>1000 900 830 810 765 735 725 715 705</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg/m²)</td>
<td>5.7 9.0 9.5 10.5 11.5 12.5 14.5 15.0 16.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modulus of Elasticity (3-point) longitudinal diagonal</td>
<td>4.430 2.140</td>
<td>3.650 2.100 3.000 1.850 6.500 6.350 5.850 5.100 5.200 4.300 ISO 178</td>
<td></td>
</tr>
<tr>
<td>Tensile Strength, 21°C (N/mm²) longitudinal diagonal</td>
<td>90 47</td>
<td>70 36 60 37 53 53 44 44 44 37 ISO 178</td>
<td></td>
</tr>
<tr>
<td>Modulus of Elasticity under working conditions (N/mm²)</td>
<td>- 3.850 3.800 7.600 8.350 7.400 5.950 6.650 5.200 EN 408</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modulus of Shear (N/mm²)</td>
<td>- 58 57 110 109 108 143 131 134 EN 408</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shear Resistance (N/mm²)</td>
<td>&gt; 6 EN 789</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Thermal Properties

| Thermal Conductivity (W/(m K)) | - | 0.11 |
| Thermal Expansion Coefficient, (10⁻⁶ m/(m K)) | 70 | 42 |
| Long-Term Heat Resistance | > 90°C | > 90°C ISO 75 |

#### Fire behavior

Fire behavior: B2 normally inflammable DIN 4102

#### Other Properties

- Water Absorption / Change of Dimensions: 0%
- Nail Holding Ability: comparable with plywood sheets coated with phenolic resin
- Surface hardness (Shore D): 70 66
- Scratch Resistance (N): 0.70 0.50 DIN 53799
- Abrasion Resistance (AT 1/rotations): > 28,000 > 11,000 DIN 53799

### Processing

- at site: like wood
- industrial production: with optimized cutting and drilling geometries

Tab. 9.1