Güteschutzverband
Betonschalungen

GSV Guidelines
Quality Criteria
for Rental Formwork

Version: 04.2021

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1 Preliminary comments

The renting of formwork materials is one of the areas of business of formwork manufacturers and companies selling construction equipment.

In the interest of transparency in the relationship between the hirer and rental company, it is necessary to define the quality criteria of rental formwork. The Güteschutzverband Betonschalungen Europa e.V. (Quality Protection Association for Concrete Formwork Europe, (GSV)) has published the guideline *Quality Criteria for Rental Formwork* to address this point. The characteristic features defined in these guidelines must be maintained for deliveries of rental materials and define the standards for evaluation when the materials are returned. These guidelines replace the corresponding earlier versions of the GSV Guidelines published in 2000, 2003 and 2011.

The term rental formwork and the services associated with the renting of formwork are defined in the instructional booklet *Rental Formwork* published by the GSV.

In the event that no other agreements have been concluded between the hirer and rental company, the rental company's general terms of trading and general terms of rental and supply shall apply.

2 Basic principles

The GSV instructional booklet *Rental Formwork*, published in April 2021, states the following about rental formwork:

- As a general rule, rental formwork is used equipment. There is no entitlement to new materials.
- The rental formwork itself must be in a clean, technically proper and functional condition.
- All rental formwork used is to be inspected by the rental company at the depot before delivery and after return in accordance with GSV guidelines.
- Due to the corresponding expertise and professional competence, repairs are only to be carried out by the rental company.
- The formlining may exhibit appropriate and correctly implemented areas of repair. Special formlining requirements, for example exposed concrete quality finish, are to be agreed upon in advance between the hirer and rental company.

It is to be bundled in shipable units that can be transported safely. Logistics have a considerable influence on whether damage to rental formwork is prevented during storage and transport. Suitable transport containers must be used when stacking rental equipment (e.g. stacking devices, pallets) as well as other suitable measures to prevent damage and safety during transport (e.g. use stacking aids, slip-resistant materials, strapping etc.). In addition, the formlining edges must be protected by suitable means when bundling.

The rental formwork is inspected at the rental depot in accordance with these GSV guidelines and, if necessary, supplemented by a check according to conditions laid down by the rental company. In cases of any deviation from the required condition, measures deemed appropriate by the rental company are taken and charged accordingly. Repairs are to be carried out in accordance with Clause 2.3 of the GSV instructional booklet *Rental Formwork* by the rental company. Damaged components must be taken out of use by the rental company.

The limiting values of the changes in the characteristic features are subsequently listed and documented in part with the help of photographs. The given values accommodate changes in characteristic features that correspond to correct and professional use on the construction site and fulfil all customary requirements regarding the quality of the concrete surface. Damage caused by inappropriate handling, for example mechanical damage from the use of force, is not taken into consideration. This is not permissible.

3 Product-related quality criteria

Quality criteria are arranged according to product groups and listed as follows:

- Clause 3.1:
  Crane-dependent/-independent steel and aluminium modular frame formwork for walls
- Clause 3.2:
  Crane-dependent girder wall formwork
- Clause 3.3:
  Crane-dependent girder and modular frame formwork for circular walls
- Clause 3.4:
  Adjustable telescopic props
- Clause 3.5:
  Timber girders, 200 mm high

- Clause 3.6:
  Timber girders, 240 mm high
- Clause 3.7:
  Modular slab formwork
- Clause 3.8:
  Standard table forms
- Clause 3.9:
  Column formwork
- Clause 3.10:
  Accessories

3.1 Crane-dependent/-independent modular frame formwork for walls

3.1.1 Formlining – permissible and impermissible features

3.1.1.1 Cleaning condition

Required cleaning condition: used, free of concrete residue, laitance is permissible.

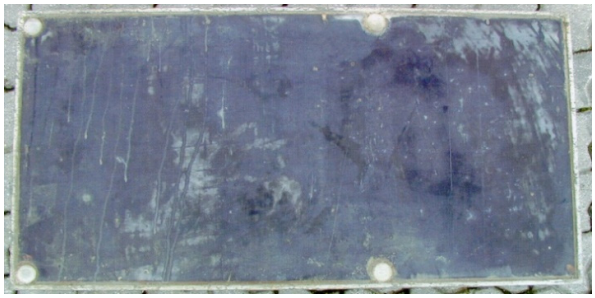

Photo 1:
Example of a required cleaning condition.

3.1.1.2 Mounting of formlining

The formlining must be firmly mounted in the frame. The gaps between the frame and the formlining must be completely closed.

3.1.1.3 Swelling

Formlining projection on the longitudinal and lateral sides of the frame is permissible up to 1 mm.

3.1.1.4 Additional drill holes

Additional drill holes are impermissible.

3.1.1.5 Nail holes

Nail holes are permissible to a limited extent.

3.1.1.6 Surface damage

Scratches and areas of surface damage, e.g. effects of internal vibrators, are permissible to a limited extent, as long as they do not penetrate the surface layer of the formlining. With wood and wood composites as well as plastic boards, the permissible value is about 1 mm. Sawing cuts are not permissible. Rental company specifications must be observed at all times.

Photo 2 Impermissible damage in the formlining (depth greater than 1 mm, surface veneer penetrated)

3.1.1.7 Foreign bodies

Foreign bodies such as projecting nails are impermissible.

3.1.1.8 Formlining repairs

Correctly and professionally executed repairs are permissible. The maximum permissible number and position of repair sites depend on the specifications of each rental company. They are to be evaluated according to the system laid down by the rental company. Repairs must always be carried out in accordance with the quality and repair guidelines issued by the rental company.

3.1.1.9 Rear side of formlining

Laitance, thin layers of concrete residue, concrete splatter and scratches are permissible.

3.1.2 Frame area – permissible and impermissible features

3.1.2.1 Contact areas of the frame

Required cleaning condition: used, free of concrete residue, laitance is permissible.

3.1.2.2 Other functional areas of the frame

Laitance, thin layers of concrete residue, concrete splatter are permissible only if the functional efficiency of the formwork element is not impaired.

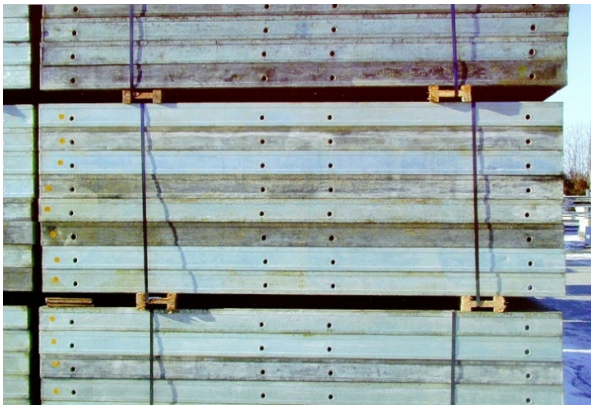

Photo 3:
Example of required cleaning condition of the contact areas

3.1.2.3 Anchor sleeves, frame sleeves

Anchor sleeves, frame sleeves must be free of concrete.

3.1.2.4 Holes and cracks

Holes and cracks in the frame are impermissible.

3.1.2.5 Repairs

Correctly and professionally executed repairs on the frame are permissible. Repairs are to be carried out only by the rental company.

3.2 Crane-dependent girder wall formwork

Refers to crane-dependent, ready-for-use and flat girder formwork with a girder grid consisting of timber formwork girders and steel walings. Three-ply sheeting or veneered plywood is predominantly used as formlining.

3.2.1 Formlining – permissible and impermissible features

3.2.1.1 Cleaning condition

Required cleaning condition: used, front side and edges must be free of concrete residue, laitance is permissible.

3.2.1.2 Mounting of formlining

The formlining must be firmly mounted to the formwork girders.

3.2.1.3 Additional drill holes

Additional drill holes are impermissible.

3.2.1.4 Nail holes

Nail holes are permissible to a limited extent.

3.2.1.5 Surface damage

Scratches and areas of surface damage, e.g. effects of internal vibrators, are permissible to a limited extent, as long as they do not penetrate the surface layer of the formlining. With wood and wood composites as well as plastic boards, the permissible value is about 1 mm. Sawing cuts are not permissible. Rental company specifications must be observed at all times.

Photo 4 Permissible surface scratching

3.2.1.6 Formlining repairs

Correctly and professionally executed repairs are permissible. The maximum permissible number and position of repair sites depend on the specifications of each rental company. They are to be evaluated according to the system laid down by the rental company. Repairs must always be carried out in accordance with the quality and repair guidelines issued by the rental company.

3.2.1.7 Damage to the rear side of the formwork panel

Formlining damage up to 10 mm long (diagonally) on the rear side (formlining) is permissible.

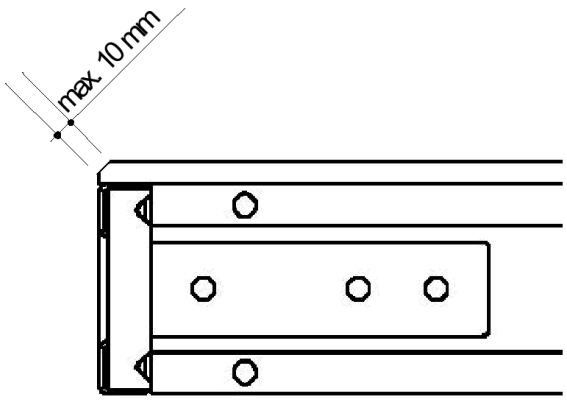

Photo 5 Permissible damage to the formlining

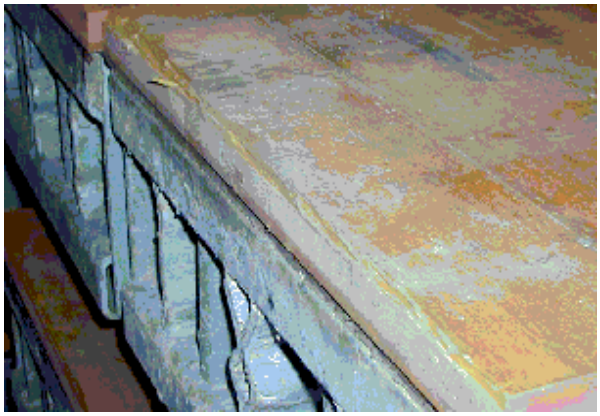

Photo 6 Permissible damage to the formlining

3.2.1.8 Rear side of formlining

Thin layers of concrete residue, concrete splatter, individual non-continuous crusts of concrete and scratches are permissible.

3.2.2 Girder grid

3.2.2.1 Contact areas for extensions

Contact areas must be free of concrete residue; laitance is permissible.

3.2.2.2 Scope of the extension function

Thin layers of concrete residue, concrete splatter, individual non-continuous crusts of concrete are permissible only if the functional efficiency of the formwork element and the extension parts is not impaired.

3.2.2.3 Timber girders, 200 mm high

See Clause 3.5

3.2.2.4 Timber girders, 240 mm high

See Clause 3.6

3.2.2.5 Steel waling

Concrete splatter and individual non-continuous crusts of concrete are permissible. Changes to system components, e.g. removal or modification to system components or welding on of additional parts, are impermissible.

Photo 7 Permissible concrete debris on steel waling

3.3 Crane-dependent girder and modular frame formwork for circular walls

Refers to crane-dependent, ready-for-use, radius-adjustable girders and frame formwork with a girder grid consisting of timber or steel formwork girders and steel walings as well as steel frames. Veneered plywood is predominantly used as formlining. It is recommended that the assembled state (for example, single spindle arrangements) of the formwork construction for delivery and return is agreed.

3.3.1 Formlining – permissible and impermissible features

3.3.1.1 Cleaning condition

Required cleaning condition: used, front side and edges must be free of concrete residue, laitance is permissible.

3.3.1.2 Mounting of formlining

The formlining must be firmly mounted to the formwork girders.

3.3.1.3 Additional drill holes

Additional drill holes are impermissible.

3.3.1.4 Nail holes

Nail holes are permissible to a limited extent.

3.3.1.5 Surface damage

Scratches and areas of surface damage, e.g. effects of internal vibrators, are permissible to a limited extent, as long as they do not penetrate the surface layer of the formlining. With wood and wood composites as well as plastic boards, the permissible value is about 1 mm. Sawing cuts are not permissible. Rental company specifications must be observed at all times.

3.3.1.6 Foreign bodies

Foreign bodies such as projecting nails are impermissible.

3.3.1.7 Formlining repairs

Correctly and professionally executed repairs are permissible. The maximum permissible number and position of repair sites depend on the specifications of each rental company. They are to be evaluated according to the system laid down by the rental company. Repairs must always be carried out in accordance with the quality and repair guidelines issued by the rental company.

3.3.1.8 Damage to the support edges

Formlining damage up to 10 mm long (diagonally) on the rear side is permissible.

3.3.1.9 Rear side of formlining

Thin layers of concrete residue, concrete splatter, individual non-continuous crusts of concrete and scratches are permissible.

3.3.2 Girder grid

3.3.2.1 Contact areas for extensions

Contact areas must be free of concrete residue; laitance is permissible.

3.3.2.2 Extension function

Thin layers of concrete residue, concrete splatter, individual non-continuous crusts of concrete are permissible only if the functional efficiency of the formwork element and the extension parts is not impaired.

3.3.2.3 Timber girders, 200 mm high

See Clause 3.5

3.3.2.4 Timber girders, 240 mm high

See Clause 3.6

3.3.2.5 Steel formwork girders

Additional drill holes are impermissible.

Changes to the girders: for example, welding on of additional components, removal of girder parts, notches in the girder itself and buckling of the girder are impermissible.

3.3.2.6 Steel waling

Concrete splatter and individual non-continuous crusts of concrete are permissible. Changes to system components, e.g. removal or modification to system components or welding on of additional parts, are impermissible.

3.3.2.7 Spindles for radii adjustment

Spindle threads must be free of any concrete residue. Laitance is permissible only if functional efficiency is not impaired.

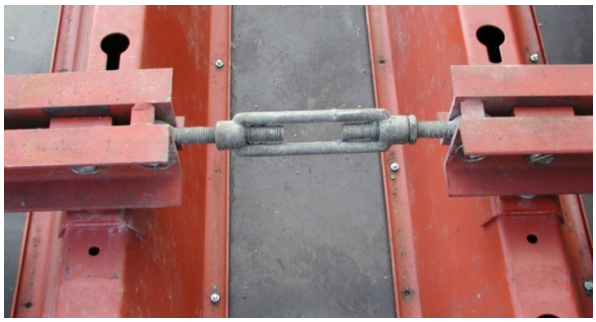

Photo 8
Example of a spindle in usable condition

3.3.3 Storage and transport

Suitable transport containers must be used when stacking rental equipment (e.g. stacking devices, pallets) as well as other suitable measures to prevent damage and safety during transport (e.g. use stacking aids, slip-resistant materials, strapping etc.).

Photo 9
Use of timbers for stacking formwork panels

3.4 Adjustable telescopic props

Refers to approved props with outer tube and extension tube (inner tube) for adjustable telescopic extensions. Materials: steel and aluminium.

3.4.1 Cleaning condition

3.4.1.1 Outer tube

The outer tube must be free of larger lumps of concrete residue and other debris. Laitance, concrete splatter and individual non-continuous areas of fine concrete residue are permissible.

Photo 10 Used props, required cleaning condition

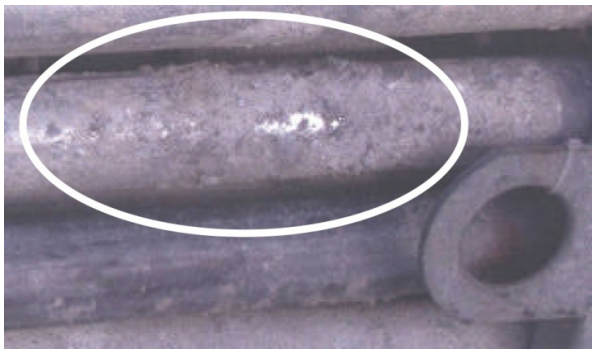

Photo 11 Impermissible large crusts of concrete

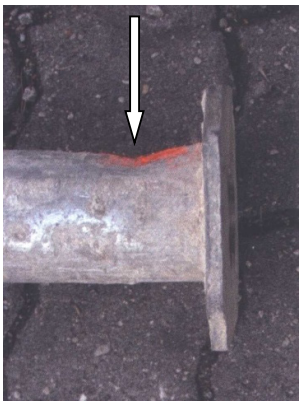

Photo 12 Impermissible dent on outer tube

3.4.1.2 Extension tube (inner tube)

The extension tube must be completely free of any concrete residue.

3.4.1.3 Thread

The thread of the adjustment device must be free of concrete residue. Laitance is permissible only if the functional efficiency is not impaired.

3.4.1.4 Head and base plates

The head and base plates must be free of concrete residue. Safe erection of the prop must be guaranteed. Concrete film and laitance are permissible.

Holes in the head and base plates must be free of any concrete residue so that accessories can be correctly attached.

3.4.2 Damage

3.4.2.1 Cracks

Cracks on components and at welds are impermissible.

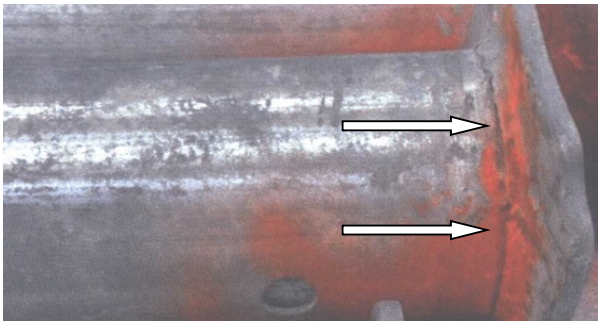

Photo 13 Impermissible crack in a weld

3.4.2.2 Deformation

Deformations of base and head plates are permissible up to 1 mm outwards and 3 mm inwards. Manufacturer specifications must be observed at all times. Dents and bulges are acceptable as long as the extent and number do not affect functionality. The extension tube must be manually extendable over its entire length. The loadbearing capacity of the prop must not be impaired.

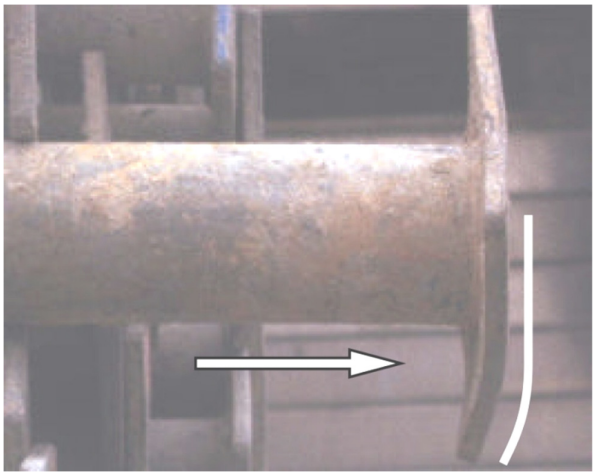

Photo 14 Impermissible deformation of the base plate

3.4.2.3 Positioning holes

The bolt holes of the prop must be free of concrete. Additional drill holes are impermissible. Only the prop manufacturer's original parts are to be used. A combination of parts from different manufacturers is impermissible.

3.4.3 Repairs

Correctly and professionally executed repairs are permissible. Repairs are to be carried out only by the rental company.

3.5 Timber formwork girder, 200 mm high

Refers to industrially manufactured formwork girders made of timber.

3.5.1 Girder chords

Splintered edges, one-sided ≤ 25 mm wide (diagonally) and ≤ 250 mm long are permissible.

Photo 15 Permissible splintered edge

3.5.2 Nail holes and additional holes

Nail holes are permissible. Additional drill holes are impermissible.

3.5.3 Notches

Notches ≤ 2 mm deep are permissible.

3.5.4 Split chords

Split chords are impermissible.

3.5.5 Cutting to length and end protection

Cutting to length of girders is impermissible. The product-specific end protection must be intact.

3.5.6 Cleaning condition

Required cleaning condition: used, free of concrete residue, laitance is permissible.

3.5.7 Foreign bodies

Foreign bodies are impermissible.

3.5.8 Repairs

Repairs to girders are impermissible.

3.6 Timber formwork girder, 240 mm high

Refers to industrially manufactured formwork girders made of timber.

3.6.1 Girder chords

Splintered edges, one-sided ≤ 33 mm wide (diagonally) and ≤ 350 mm long are permissible.

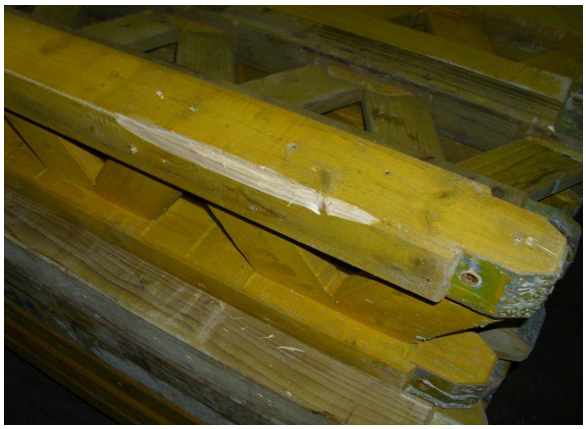

Photo 16 Permissible splintered edge

3.6.2 Nail holes and additional holes

Nail holes are permissible. Holes maximum diameter 12 mm drilled vertically from above in the chord timber and one drilled hole between two beam nodes are permissible.

3.6.3 Notches

Notches ≤ 5 mm deep, maximum one notch between two girder nodes are permissible.

3.6.4 Split chords

Split chords are impermissible.

3.6.5 Cutting to length and end protection

Cutting to length of girders is impermissible. The product-specific end protection must be intact.

3.6.6 Cleaning condition

Required cleaning condition: used, free of concrete residue, laitance is permissible.

3.6.7 Foreign bodies

Foreign bodies are impermissible.

3.6.8 Repairs

Repairs to girders are impermissible.

3.7 Modular slab formwork

Refers to crane-dependent modular slab formwork tables. The panels consist predominantly of a formlining fitted into an aluminium frame.

3.7.1 Formlining – permissible and impermissible features

3.7.1.1 Cleaning condition

Required cleaning condition: used, free of concrete residue, laitance is permissible.

Photo 17 Permissible cleaning condition formlining

3.7.1.2 Mounting of formlining

The formlining must be firmly mounted in the frame. The gaps between the frame and the formlining must be completely closed.

3.7.1.3 Swelling

Formlining projection on the longitudinal and lateral sides of the frame is permissible up to 1 mm.

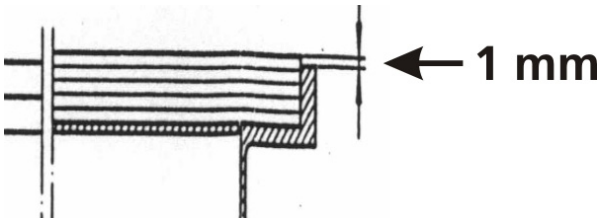

Photo 18 Formlining projections up to 1 mm are permissible

3.7.1.4 Additional drill holes

Additional drill holes are impermissible.

3.7.1.5 Nail holes

Nail holes are permissible to a limited extent.

3.7.1.6 Surface damage

Scratches and areas of surface damage, e.g. effects of internal vibrators, are permissible to a limited extent, as long as they do not penetrate the surface layer of the formlining. With wood and wood composites as well as plastic boards, the permissible value is about 1 mm. Sawing cuts are not permissible. Rental company specifications must be observed at all times.

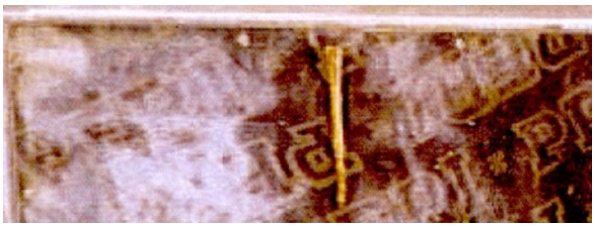

Photo 19 Impermissible scratches in the formlining (Depth > 1 mm)

3.7.1.7 Foreign bodies

Foreign bodies such as projecting nails are impermissible.

3.7.1.8 Rear side of formlining

Laitance, thin layers of concrete residue, concrete splatter and scratches are permissible.

3.7.1.9 Formlining repairs

Correctly and professionally executed repairs are permissible. The maximum permissible number and position of repair sites depend on the specifications of each rental company. They are to be evaluated according to the system laid down by the rental company. Repairs must always be carried out in accordance with the quality and repair guidelines issued by the rental company.

3.7.2 Frame area – permissible and impermissible features

3.7.2.1 Contact area of the frame

Required cleaning condition: free of concrete residue, laitance is permissible.

3.7.2.2 Other functional areas of the frame

Laitance, thin layers of concrete residue, concrete splatter are permissible only if the functional efficiency of the panel is not impaired.

3.7.2.3 Damage to the frame profile

Mechanical damage that impairs proper functioning is impermissible.

Photo 20 Impermissible damage on the frame profile

3.7.2.4 Holes and cracks

Additional drill holes and holes in the frame are impermissible. Cracks in the frame are impermissible.

3.7.2.5 Repairs

Correctly and professionally executed repairs on the frame are permissible. These are to be evaluated according to the system laid down by the rental company. Repairs must always be carried out exclusively by the rental company.

3.8 Standard table forms

Refers to crane-dependent table forms consisting of:

- Formlining,
- Girder grid,
- System components for attaching formwork props,
- Accessories.

The following always applies: changes to the table form construction are impermissible.

3.8.1 Formlining – permissible and impermissible features

3.8.1.1 Cleaning condition

Required cleaning condition: used, free of concrete residue and other debris (e.g. improper use of release agent). Laitance is permissible.

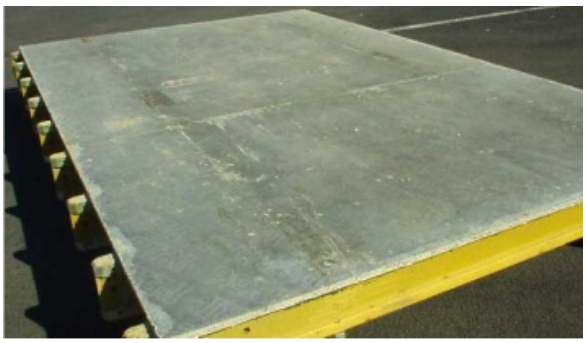

Photo 21 Permissible cleaning condition

3.8.1.2 Mounting of formlining

The formlining must be firmly mounted to the girder grid.

3.8.1.3 Fastenings

The fastenings (screws, nails, clips) may project up to 1 mm from the formlining to compensate for any swelling in the thickness of the formlining and to avoid wart-like projections on the concrete surface at the nail heads.

3.8.1.4 Formlining joints

Gaps between the formlining sheets within one slab table that result from swelling and shrinkage are permissible. Additional sealing of the joints through inserts or similar is, according to standards, not required.

3.8.1.5 Surface misalignments

Misalignments between adjacent formlining sheets due to uneven swelling of the sheets in the edge areas (differences in age and moisture content, manufacturing tolerances) or at nails and screw fastenings in the area of repairs are impermissible.

3.8.1.6 Screw and nail holes

Screw and nail holes are permissible to a limited extent.

3.8.1.7 Surface damage

Scratches and areas of surface damage, e.g. effects of internal vibrators, are permissible to a limited extent, as long as they do not penetrate the surface layer of the formlining. With wood and wood composites as well as plastic boards, the permissible value is about 1 mm. Sawing cuts are impermissible. Rental company specifications must be observed at all times.

3.8.1.8 Edge damage

Edge damage at table edges with a length of 50 mm and depth of 5 mm is permissible.

3.8.1.9 Formlining repairs

Correctly and professionally executed repairs are permissible. The maximum permissible number and position of repair sites depend on the specifications of each rental company. They are to be evaluated according to the system laid down by the rental company. Repairs must always be carried out in accordance with the quality and repair guidelines issued by the rental company.

3.8.1.10 Rear side of formlining

Thin films of concrete residue, concrete splatter, surface scratches and the proper sealing of holes on the concrete side are permitted.

3.8.2 Timber girders, 200 mm high

See Clause 3.5

3.8.3 Timber girders, 240 mm high

See Clause 3.6

3.8.4 Prop connection elements

Changes in the position of the prop connection elements are impermissible, unless otherwise stated

in the assembly and operating instructions. Deformations that impair proper functioning are not permissible.

3.9 Column formwork

Refers to crane-dependent and crane-independent circular column formwork made from steel or aluminium fitted with a steel formlining. Aluminium formlining and rectangular formwork made from steel or aluminium, fitted with a formlining made from coated plywood or steel or plastic. The criteria for frames and accessories apply in the case of rectangular column formwork produced without a formlining to allow the facing type to be chosen on site. The quality criteria listed in Clause 3.1 apply in the case of rectangular column formwork made up of frame panel elements.

3.9.1 Formlining – permissible and impermissible features

3.9.1.1 Cleaning condition

Required cleaning condition: used, free of concrete residue and other debris, laitance is permissible.

3.9.1.2 Mounting of formlining

The formlining must be firmly mounted to the subconstruction.

3.9.1.3 Nail holes

Nail holes are permissible to a limited extent in wood and plastic formlining.

3.9.1.4 Holes and bulges

Any kind of perforation or bulge in metal formlinings is impermissible.

3.9.1.5 Surface damage

Scratches and areas of surface damage, e.g. effects of internal vibrators, are permissible to a limited extent, as long as they do not penetrate the surface layer of the formlining. With wood and wood composites as well as plastic boards, the permissible value is about 1 mm. Sawing cuts are not permissible. Rental company specifications must be observed at all times.

3.9.1.6 Formlining repairs

Correctly and professionally executed repairs are permissible. The maximum permissible number and position of repair sites depend on the specifications of each rental company. They are to be evaluated according to the system laid down by the rental company. Repairs must always be carried out in accordance with the quality and repair guidelines issued by the rental company.

3.9.1.7 Rear side of formlining

Thin layers of concrete residue, concrete splatter and scratches are permissible.

3.9.1.8 Foreign bodies

Foreign bodies such as nails are impermissible.

3.9.2 Frame area – permissible and impermissible features

3.9.2.1 Contact areas of the frame

Required cleaning condition: free of concrete residue, laitance is permissible.

3.9.2.2 Other functional areas of the frame

Laitance, thin layers of concrete residue, concrete splatter are permissible only if the functional efficiency of the formwork element is not impaired.

3.9.3 System components

Changes to system components, for example the welding on of additional components, is impermissible.

3.10 Accessories

3.10.1 Functional contact areas

Required cleaning condition: used, free of concrete residue, laitance is permissible.

3.10.2 Other functional areas of accessories

Laitance, thin films of concrete residue and concrete splatter are permissible as long as the functionality of the accessories is not impaired.

4 Concluding remarks

These guidelines define the quality criteria for rental formwork for the hirers and the rental companies and further improve transparency in the use of modern formwork technology. The guidelines are based on the principles contained in the GSV instructional booklet *Rental Formwork* (Version April 2021).

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