BRUAG
Innovation for Architecture

Stair Railings

MDF design, classic
CELLON® design
OAK PLYWOOD design, classic

Technical data sheet for planning,
construction and execution

I.4

Version 3.0

Table of Contents

General Information 01.

Material

The **MDF board** is a wood-based material made of finely fibrillated softwood, which is pressed into a board product that is equally homogeneous in the longitudinal and transverse directions.

Application area: Interior (e.g. ceiling and wall cladding, stair railings)
Panel thickness (weight): 10mm (approx. 7kg/m²), 19mm (approx. 14kg/m²), 30mm (approx. 22kg/m²)
Reaction to fire class: RF3, D-s2-d0 (EN 13986)

The **CELLON® panel** is a high-pressure laminate panel (HPL Compact or solid core panel) consisting of 70% cellulose webs and 30% phenolic resin. The extremely weather and frost-resistant material is ideal for outdoor applications.

Application area: mounted vertically in outdoor areas (e.g. facades, balcony railings)
Panel thickness (weight): 8mm (approx. 12kg/m²), 10mm (approx. 15kg/m²)
Reaction to fire class: RF2, B1 (DIN 4102-1), B-s1-d0 (EN 13501-1)

The **OAK PLYWOOD panel** consists of individual layers of wood, which are glued and pressed crosswise to their fibre direction. This reduces directional properties such as swelling and shrinkage.

Application area: Interior (e.g. ceiling and wall cladding)
Panel thickness (weight): 18mm (approx. 7kg/m²)
Reaction to fire class: RF4, E (EN 13986)

The raw panels are project-specifically cut to the desired dimensions using laser technology (including drill holes). You choose the **width (x)** and the **length (y)** of the panels individually. Do you want round cuts or additional cut-outs? Simply draw them in your DXF plan and they will be **manufactured to size**.

Panel Formats

Please consider the following raw panel formats for waste optimisation:

perforated or plain panels

MDF® design, classic

Raw width	Raw length
2050 mm	4080 mm

perforated panels

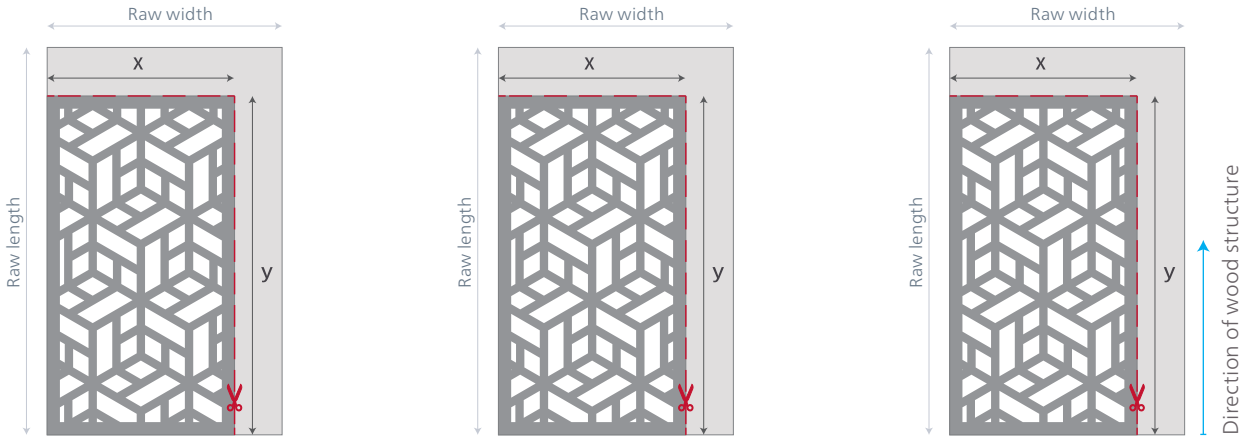
CELLON® design

Raw width	Raw length
1200 mm	2400 mm
1280 mm	3000 mm
1500 mm	3600 mm
1800 mm	3600 mm

perforated or plain panels

OAK PLYWOOD design, classic

Raw width	Raw length
1500 mm	3000 mm



Whenever possible, the raw material sizes should be considered when planning the panel layout so that panel waste can be minimised. We support you with this.

General Information 01.

Data Transmission for Orders

Please note the following when placing an order:

Data Format

- DWG / DXF Data
- Cadwork 2D or 3D Data
- Parts lists in Excel (if only as Excel without CAD file is sent, it might result in additional work in our work preparation)

Data Content and Structure

- Panels are drawn on a separate layer
- Drawing in 1:1 ratio
- Measurement of at least one long and short side to be able to verify the scale
- Boreholes (drawn as a closed circle), cut-outs, etc. are marked accordingly
- Special requests for grouping and/or palletisation must be explicitly specified. Normally there is room on one pallet for 120 square metres of panels. Within the pallet there is no sorting by panel numbers etc.

Own Design (the following specifications must be observed for own designs)

- Design must be created as CAD drawing (DWG or DXF file)
- Contours must be neatly closed and drawn as a line (not several lines on top of each other)
- Size ratio must be clearly visible

In the event of post-processing by Bruag Design Factory AG, the resulting additional work will be invoiced.

Storage and Cleaning Instructions

The panels must never be stored outdoors. The panels can be cleaned with water and a fabric or magic sponge. Do not use any chemical cleaning agents.

Cutting and Drilling Guidelines

Basically, cutting to size on site should be avoided and the panels should already be ordered to the project-specific size whenever possible. However, in exceptional cases it is possible to process the panels on site, with the note that the panels are coated and the cut edge will therefore not have the same colour after cutting as the surface. Tools with carbide cutting edges or diamond cutting edges are advantageous as cutting items. The visible side should be at the top when cutting and, if possible, a guide rail should be used.

Spiral or dowel drills made of solid carbide are ideally used for drilling.

The material does not require post-treatment from the point of view of weather protection. However, if necessary, the edge can be coated with the supplied reserve paint.

General Information 01.

Breakthrough Safety/Raling Statics

Our panels are to be considered as fillings and must meet the requirements for breakthrough safety. The CELLON® panel in only 8mm and 10mm thickness have been tested separately according to the ETB guidelines “Components that protect against falling” and meet these requirements. Customer-specific designs/perforations must be assessed on a case-by-case basis.

The mandatory and load-bearing substructure with its supports must be calculated and the number determined by the metal worker. The metal worker must also determine the distances between the posts. These depend, among other things, on the dimensioning of the substructure. Our panels can also be mounted on existing substructures, there it is important to ensure that our fastening and planning instructions are followed as well. The panel thickness to be selected depends on the design, the support of the panels, the type of object and the locally applicable building regulations.

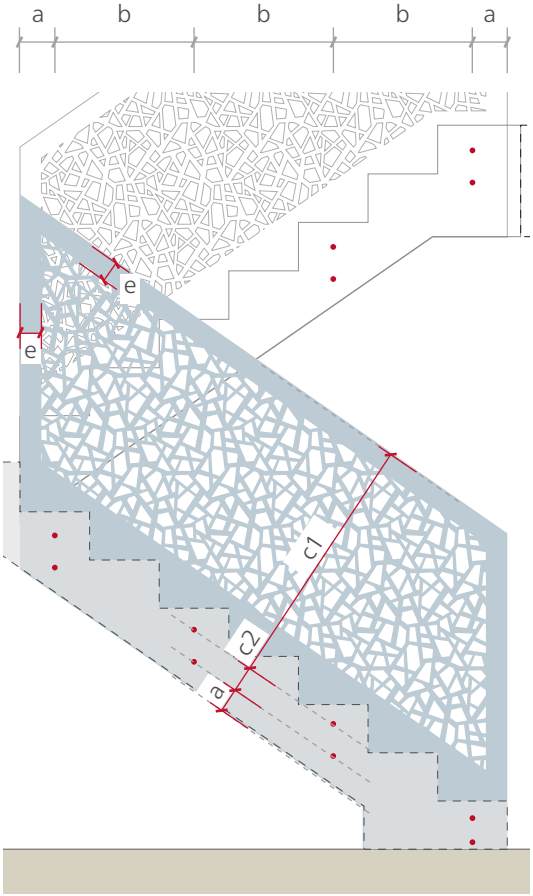
Protection against Overclimbing

In addition to break-through safety, the CELLON®, MDF and OAK PLYWOOD panels with their perforations must meet the requirements for protection against overclimbing. Depending on the country and region, different guidelines and regulations apply, which must please be observed when planning. We cannot make any statements on this or check the plans accordingly. This is the responsibility of the respective planning and execution body.

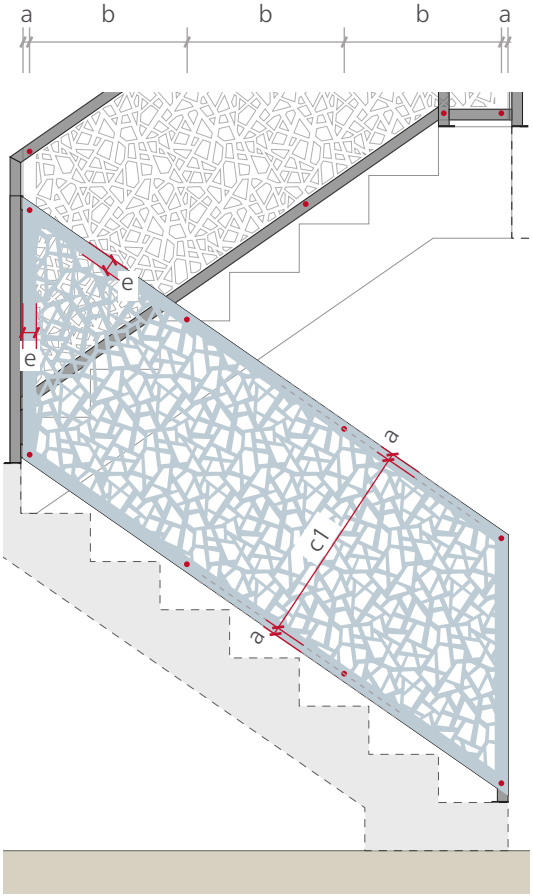
Fastenings 02.

Fastening Distances for Stair Railings

Without Substructure



With Substructure



MDF design / CELLON® design

Position	Description	Minimum distance	Maximum distance	Recommended distance	Unit
a	Distance borehole to edge	20	100	25	mm
b	Horizontal borehole distance	500	700	600	mm
c1	Vertical borehole distance (1)	n/a	1000	900 - 1000	mm
c2	Vertical borehole distance (2)	n/a	350	n/a	mm
e	Frame without perforation	50	n/a	50	mm

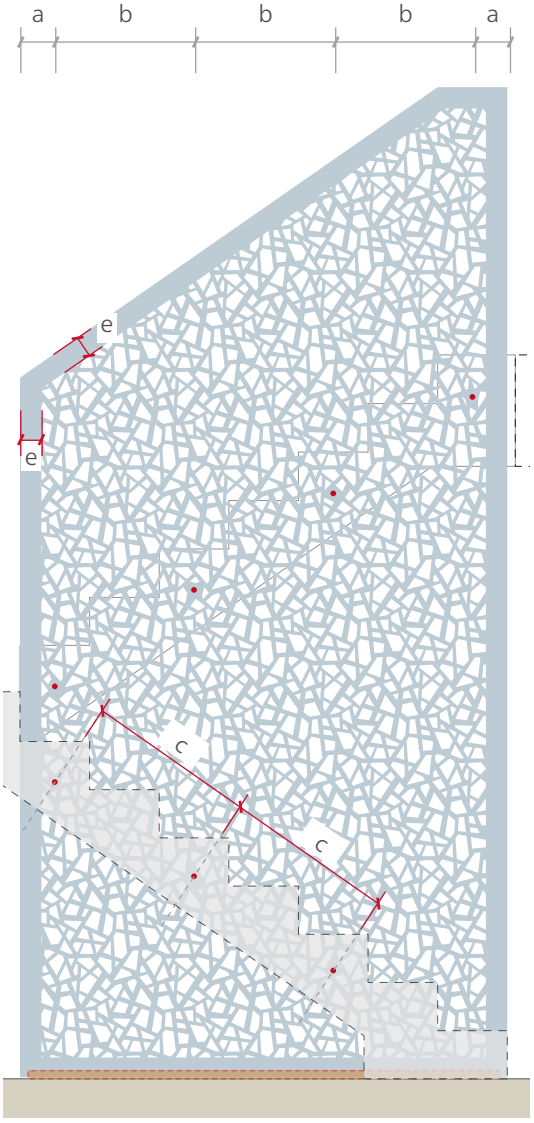
Reciprocal conversion:
c (adjusted) = **b** (max) / **b** (effectiv) x **c** (max)
b (adjusted) = **c** (max) / **c** (effectiv) x **b** (max)

Fastenings

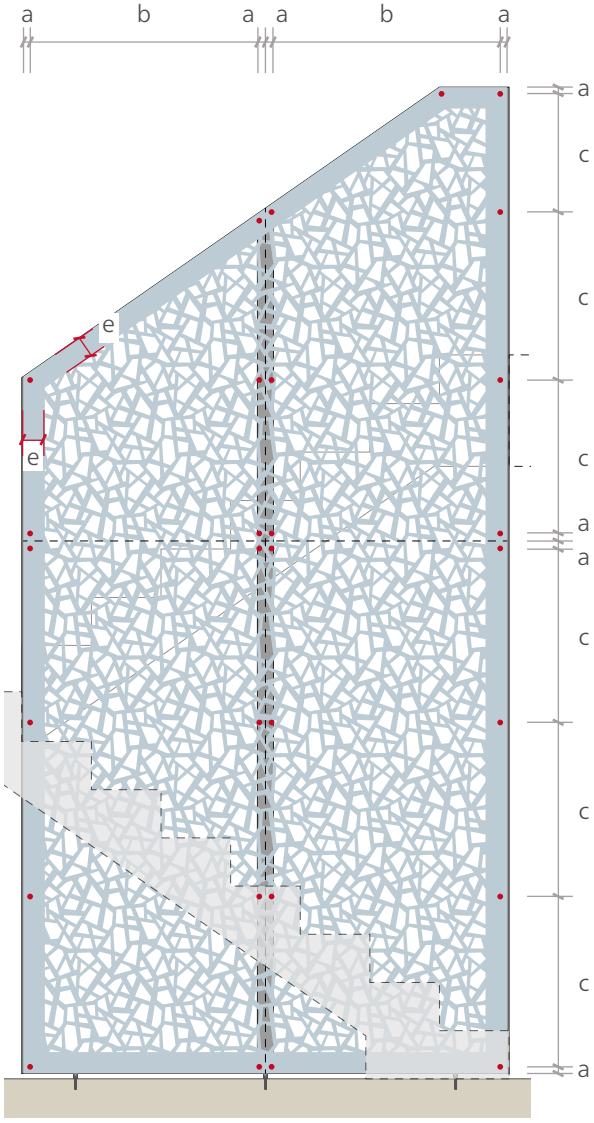
02.

Fastening Distances for Stair Curtains

Without Substructure



With Substructure



Position in mm	Description	Maximum distance MDF design 30 mm	Maximum distance CELLON® design 8/10 mm
a	Distance borehole to edge	20	
b	Horizontal borehole distance	700	970
c	Vertical borehole distance	600	645
e	Frame without perforation	50	

Reciprocal conversion:
c (adjusted) = **b** (max) / **b** (effectiv) x **c** (max)
b (adjusted) = **c** (max) / **c** (effectiv) x **b** (max)

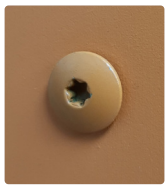
Fastenings 02.

Fasteners

Wooden Substrucure

Truss-head Screw

Material:	Stainless steel A2
Length:	38 mm
Nominal diameter:	4.8 mm
Head diameter:	12 mm
Drives:	TX20
Borehole diameter:	8 mm



Metal Substructure

Hexagon-head screw (self-drilling with sealing washer)

Material:	Stainless steel A2 (with drill point and shaped thread made of hardened steel)
Length:	32 mm
Nominal diameter:	5.5 mm
Head diameter:	16 mm
Drives:	SW8, hexagon head
Borehole diameter:	8 mm

Blind Rivet

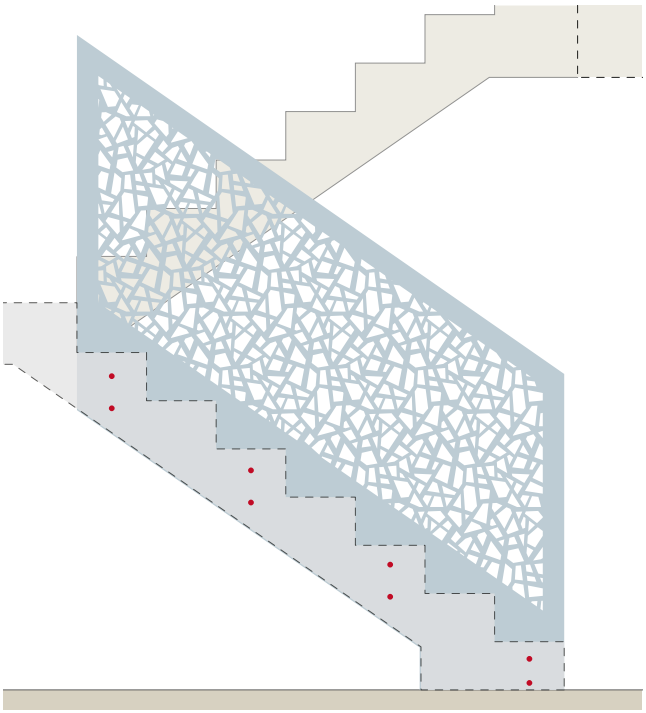
Material:	Aluminium/Stainless steel A2
Length:	8-13 mm
Nominal diameter:	5.0 mm
Head diameter:	14 mm
Drives:	Blind rivet tool
Borehole diameter:	8 mm

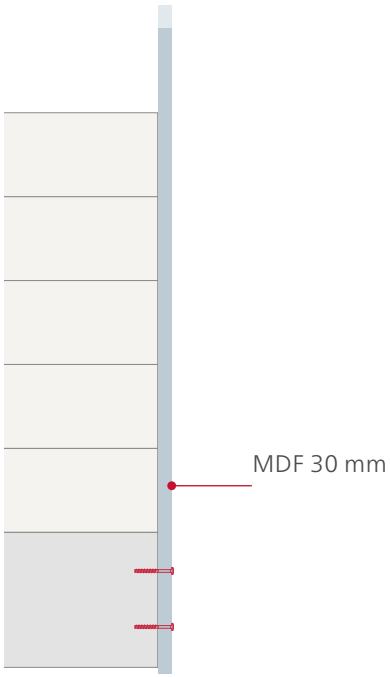
The fasteners listed above are suitable for mounting the panels on a metal or wooden substructure. The fastening of self-supporting and post constructions railings directly into the concrete or the stair stringer are to be defined by the execution company according to static calculations.

Substructure 03.

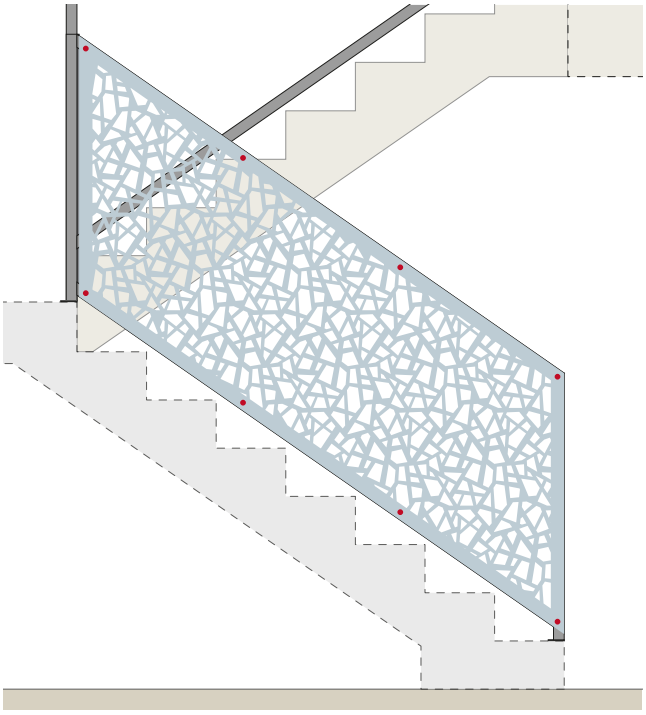
Stair railings made of **MDF 30mm** can be installed without an additional substructure. For railings made of **CELLON®**, **MDF 19mm** or **OAK PLYWOOD**, additional frames or a supporting substructure must be planned.

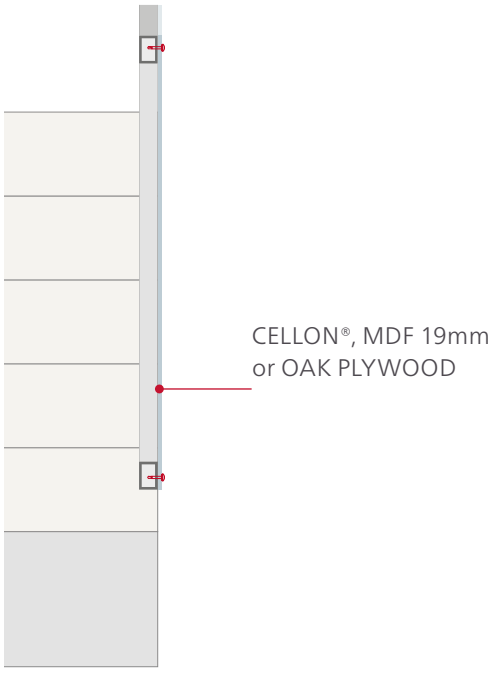
Self-supporting Railing without Substructure





Railing with Substructure

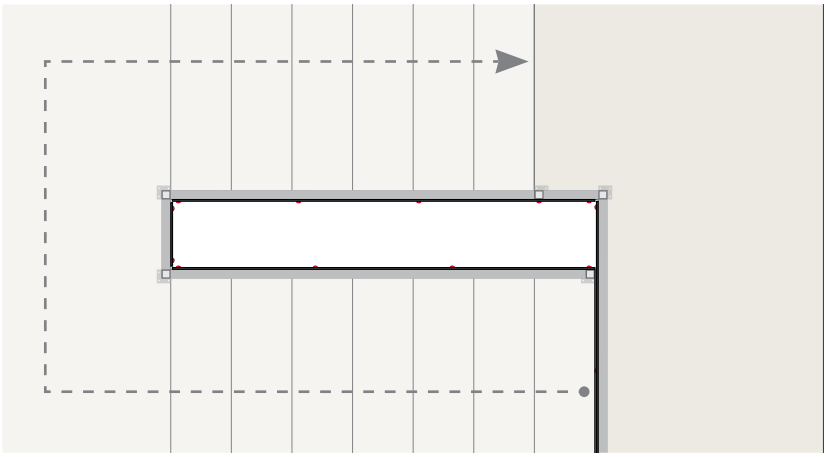




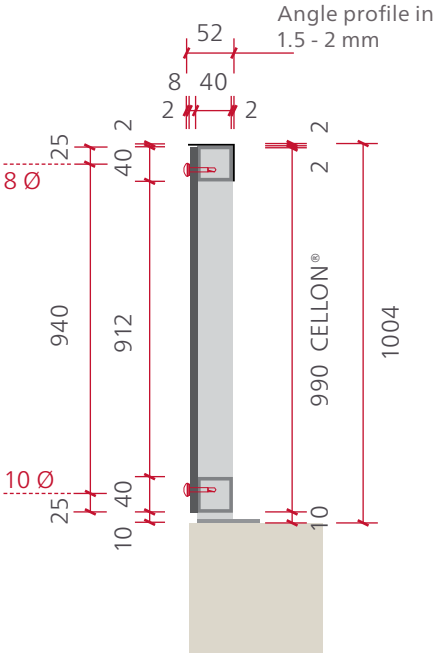
Substructure 03.

Stair Railing

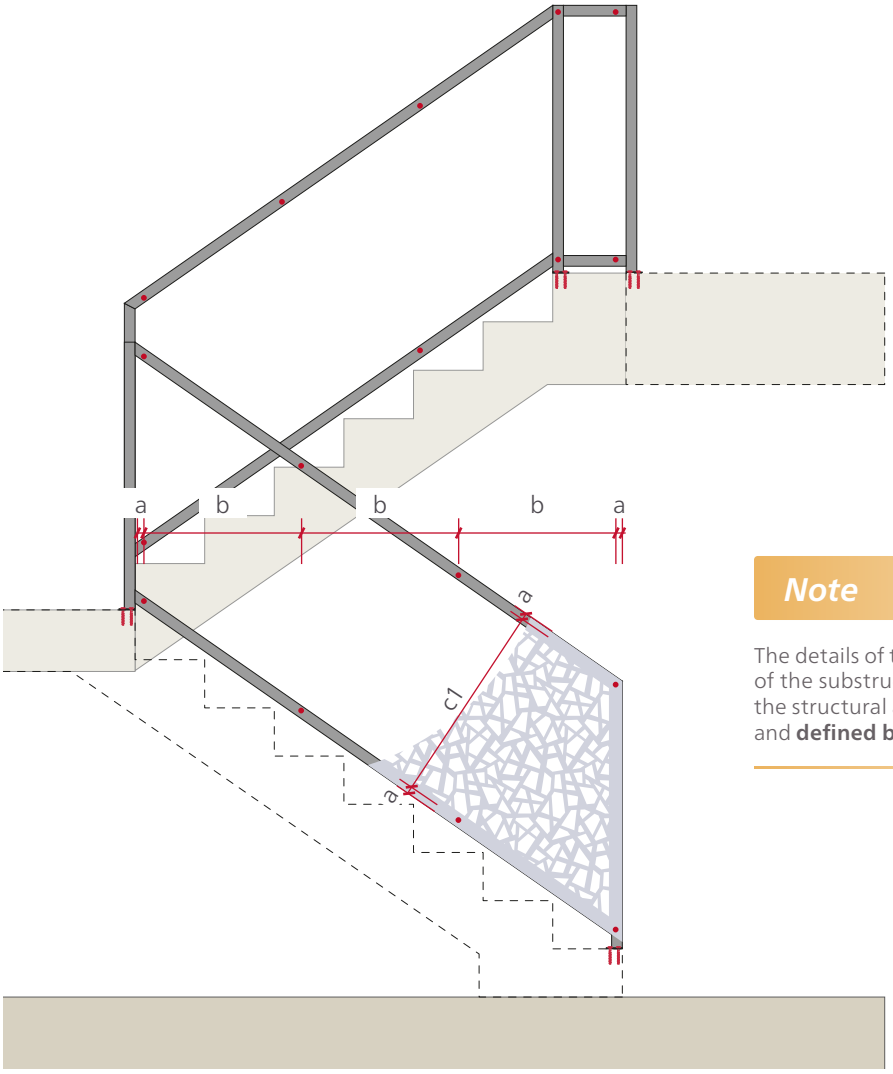
Floor Plan



Detail



Elevation Plan



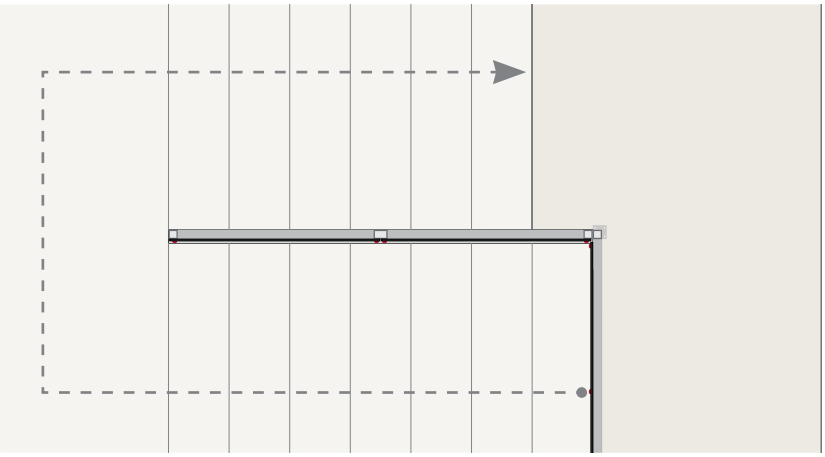
Note

The details of the railing statics, including the **dimensioning** of the substructure, must be carried out in accordance with the structural and static regulations of the respective region and **defined by the metal construction company.**

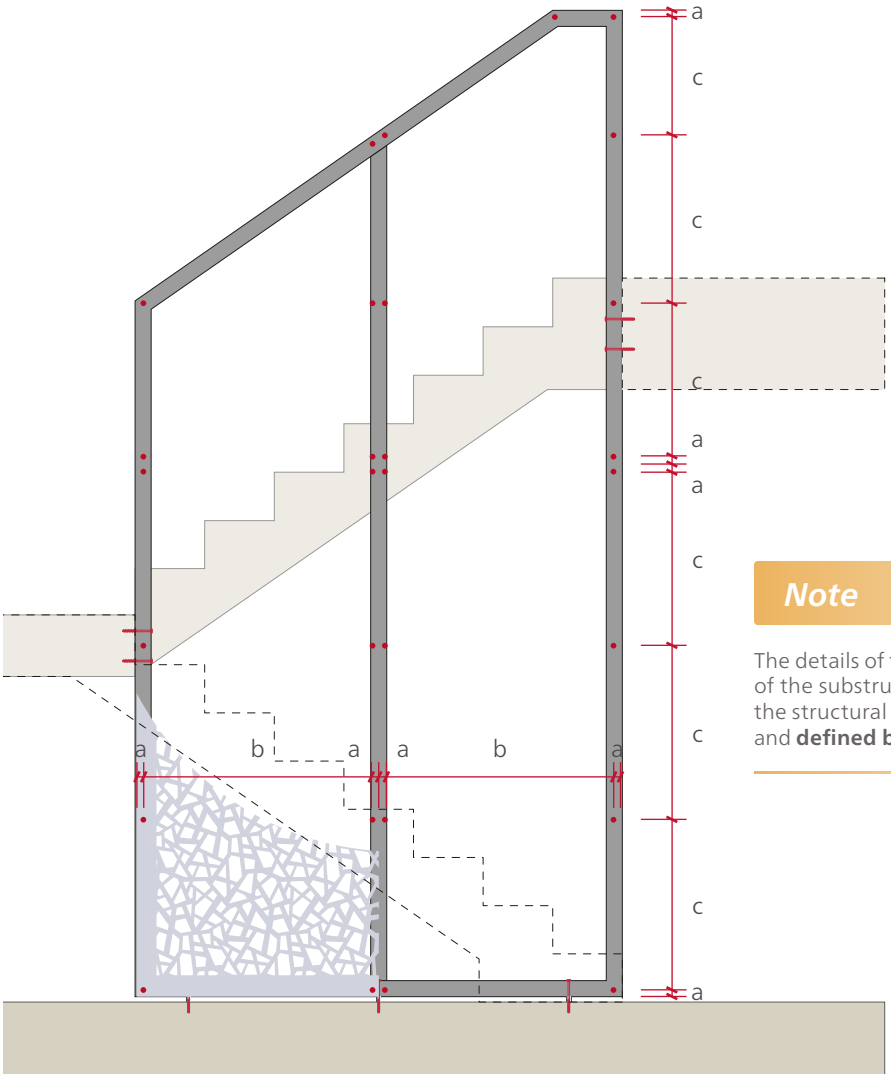
Substructure 03.

Stair Curtain

Floor Plan



Elevation Plan



Note

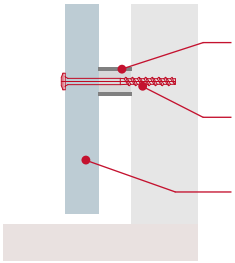
The details of the railing statics, including the **dimensioning** of the substructure, must be carried out in accordance with the structural and static regulations of the respective region and **defined by the metal construction company.**

Construction Solutions 04.

Stair Curtain in MDF 30mm

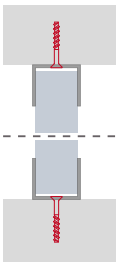
When using **MDF 30mm** thickness, you have a self-supporting material that does not require additional substructure. In this case, it is necessary to plan enough fastening points to a solid structural element. Wherever possible, the panels are to be fixed to the wall, ceiling or floor.

Fastening to Stringers or Concrete Stairs

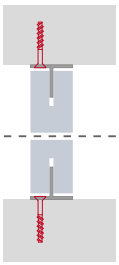


Fastening to Floor and Ceiling

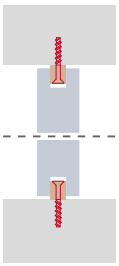
U-profile



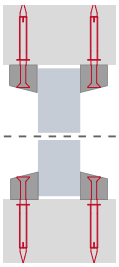
T-profile



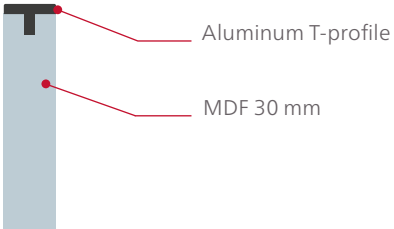
Grooved strip

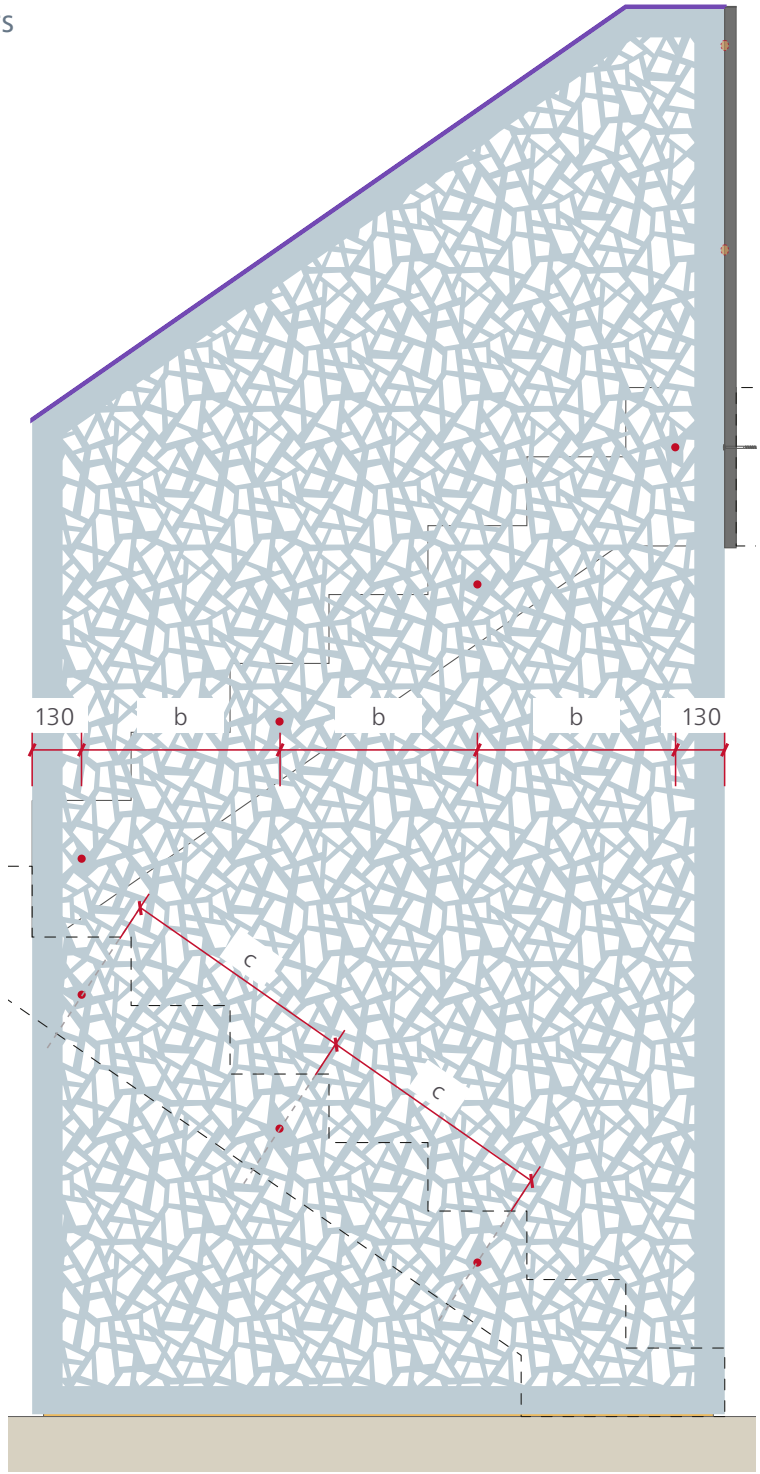


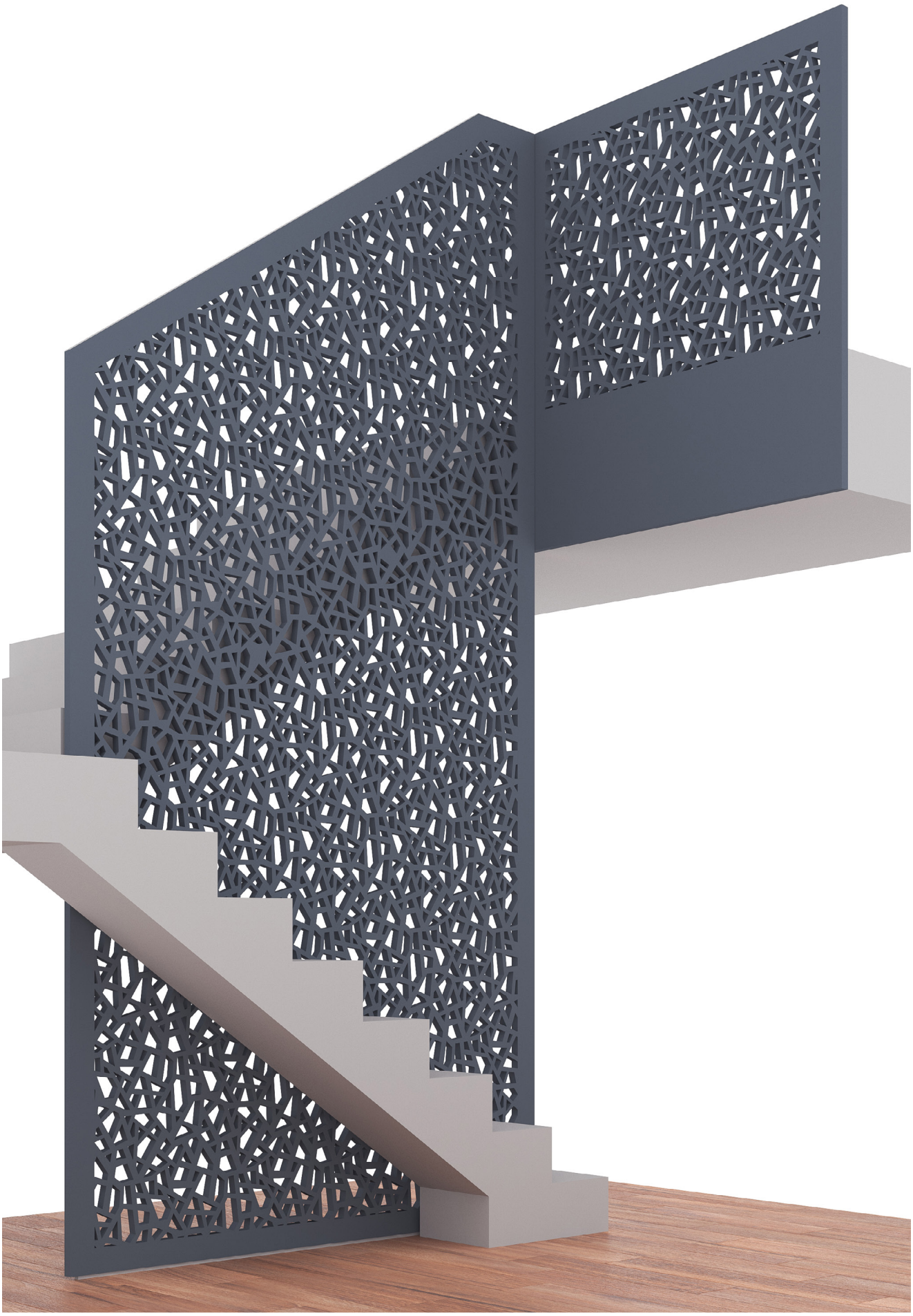
Profile bars



Handrail with T-Profile





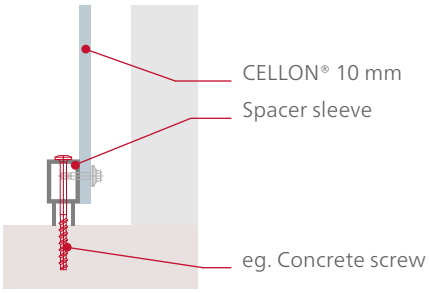


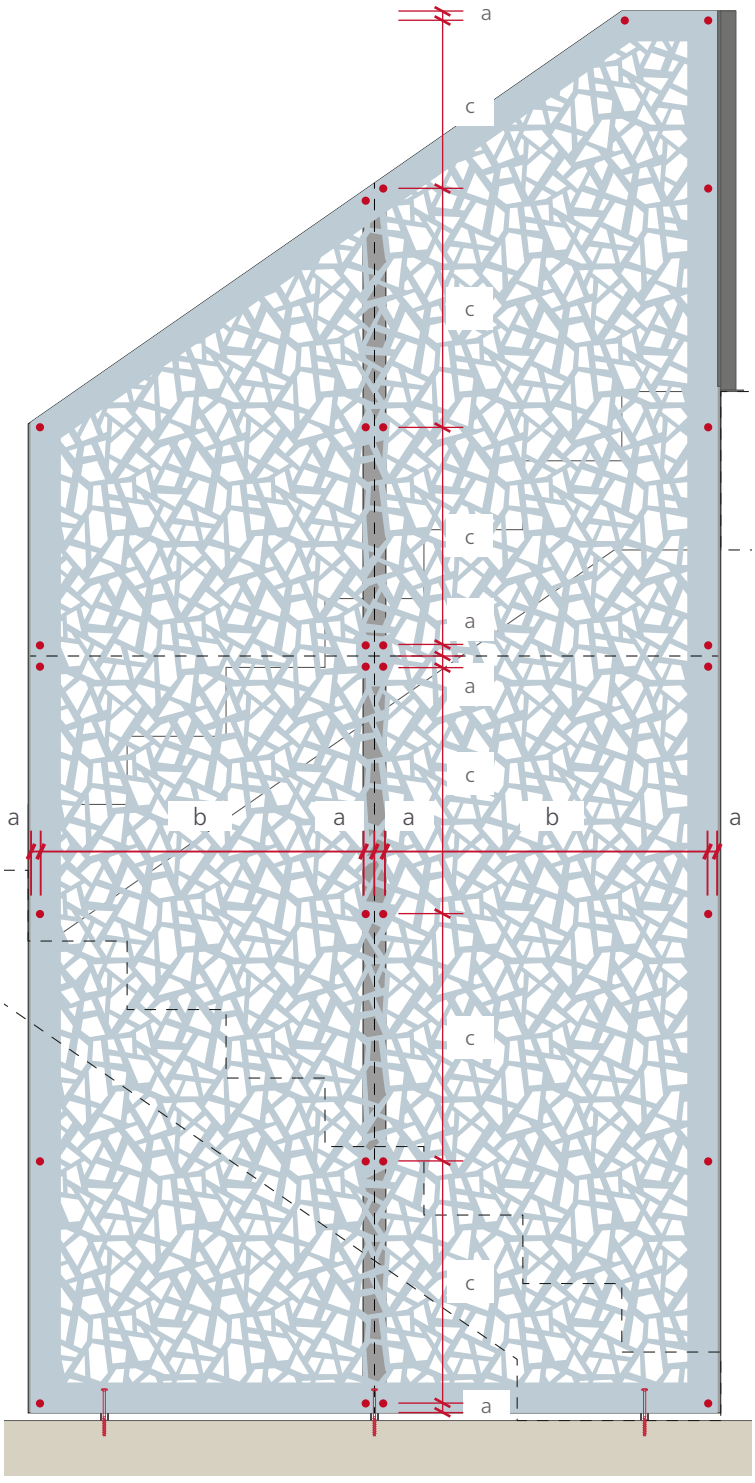
Construction Solutions 04.

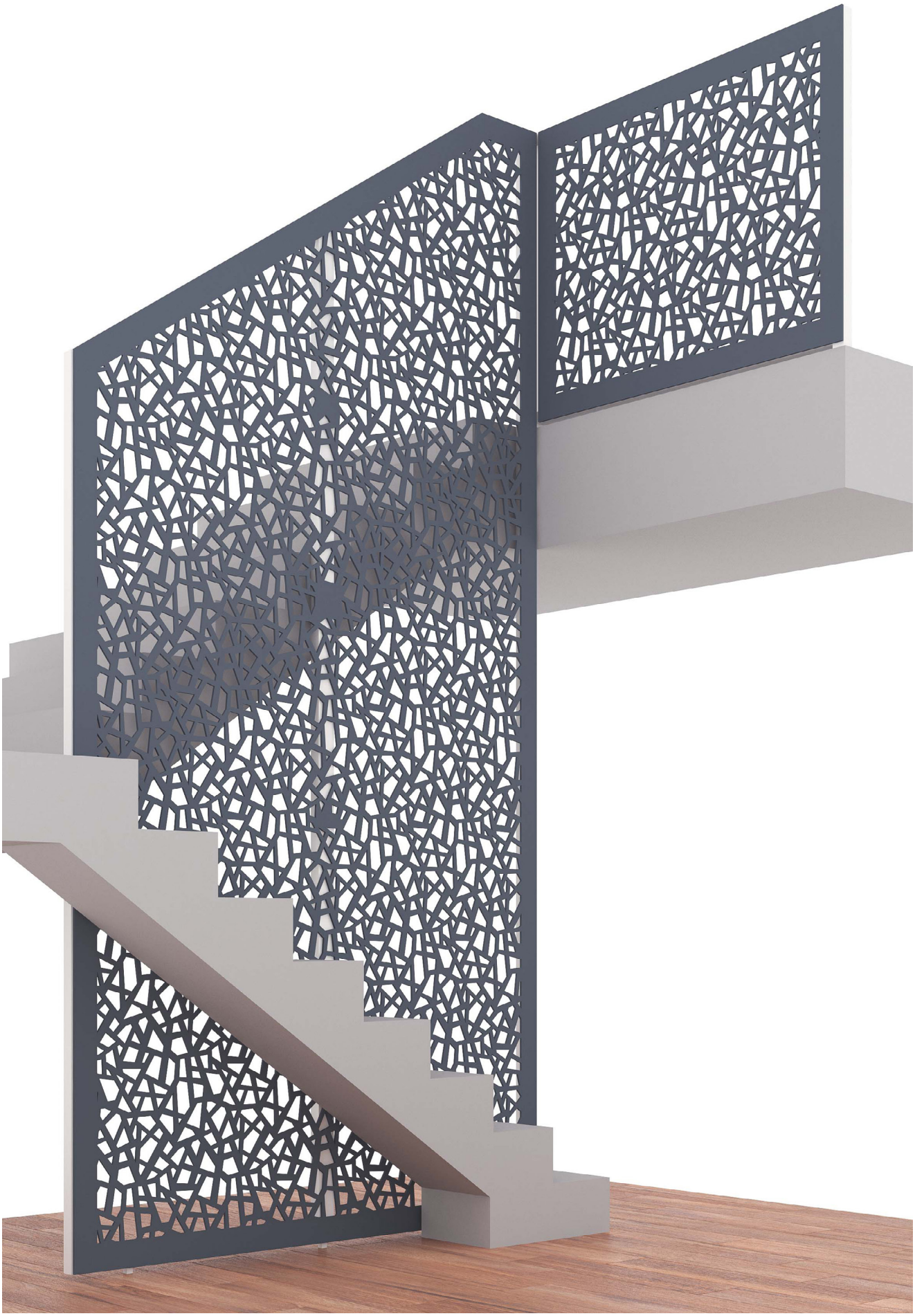
Stair Curtain with Substructure

Stair curtains made of **CELLON®**, **MDF 19mm** or **OAK PLYWOOD** require a frame construction made of metal. This can be a square or L-profile, to which the panels are fixed. The dimensions of the profiles for the frame must be defined by the executing craftsman.

Fastening to Floor and Ceiling





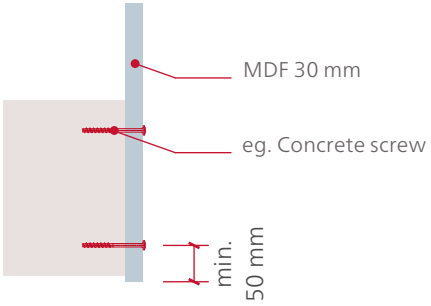


Construction Solutions 04.

Stair Railing in MDF 30mm

Stair railings made of **MDF 30 mm** are self-supporting, just like the stair curtains, and do not require an additional frame structure. The railings must be connected to each other and fixed to structural elements wherever possible. In particular, it is recommended to fix the return railing to the wall over the entire height. This increases the stability significantly.

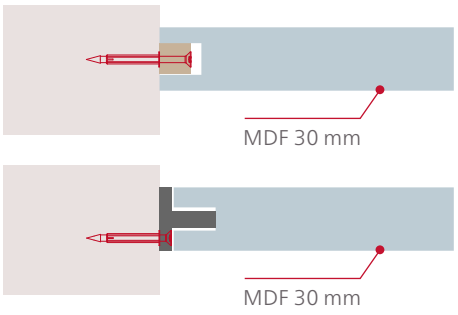
Fastening to Stringers or Concrete Stairs



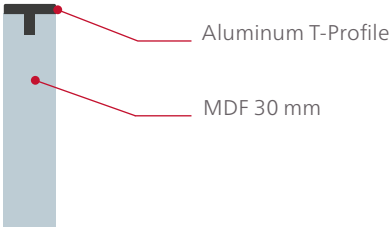
Fastening Between Stair Flights

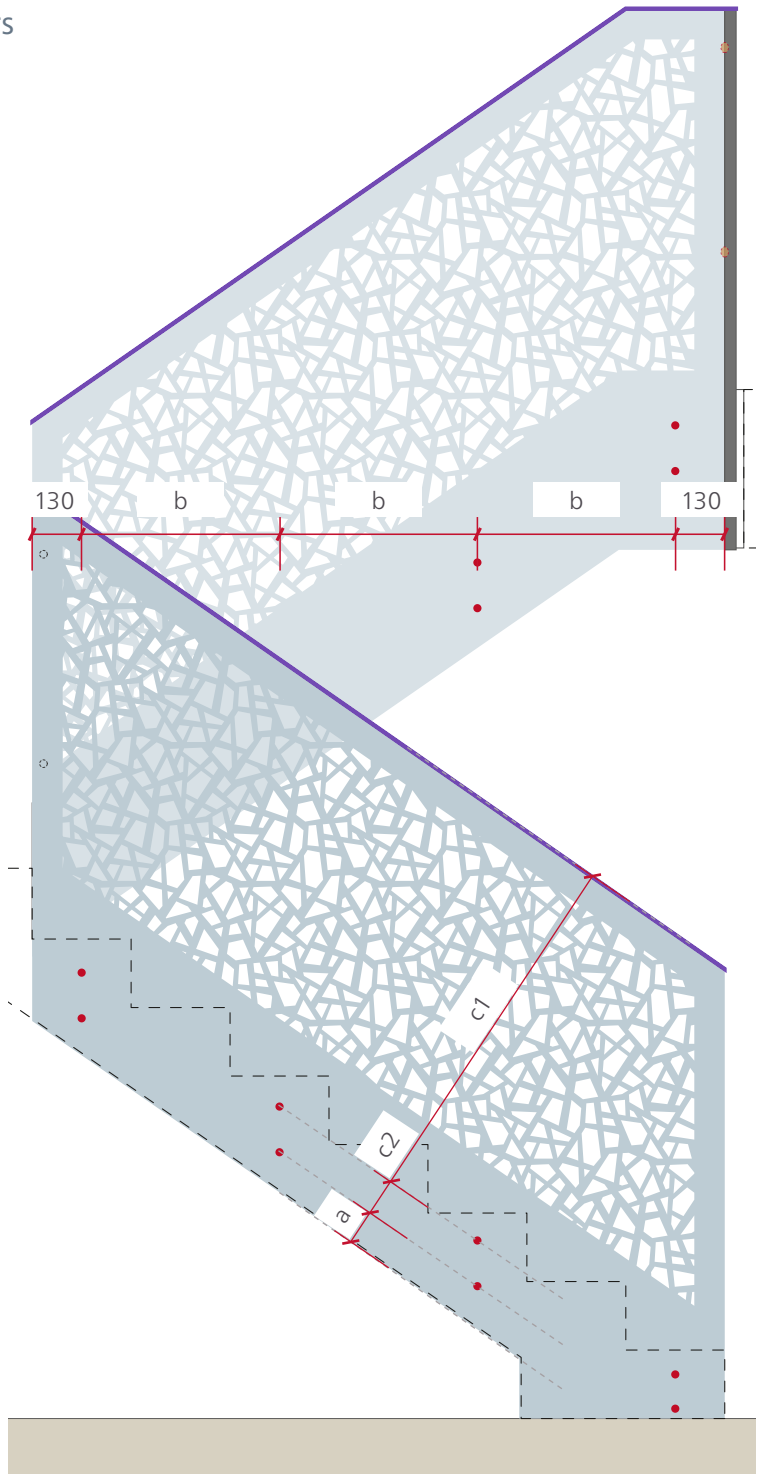
depending on the width of the stair eye, an MDF strip can also be used.

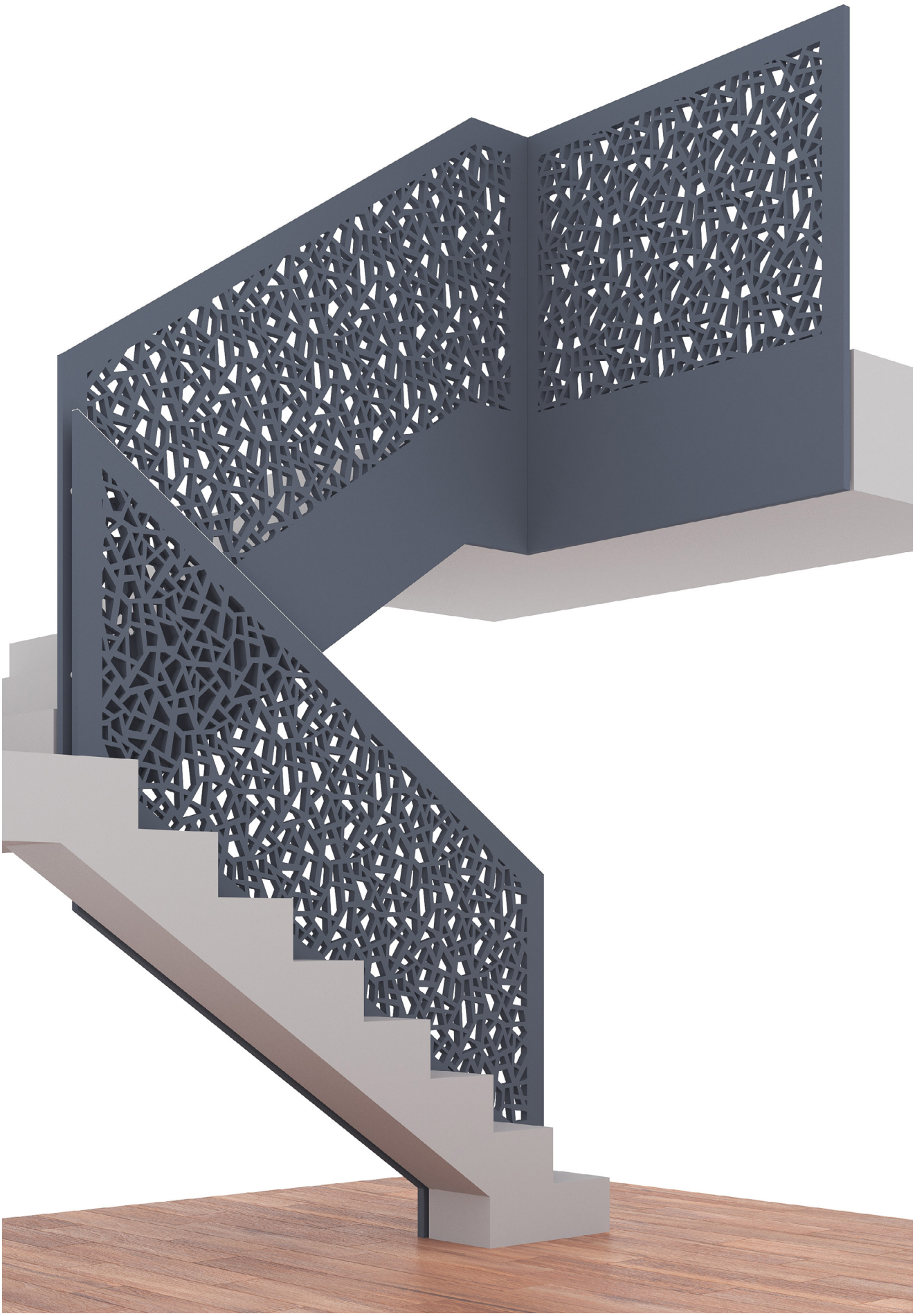
Wall Return Connection



Handrail with T-Profile







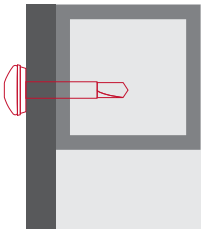
Construction Solutions 04.

Stair Railing with Substructure

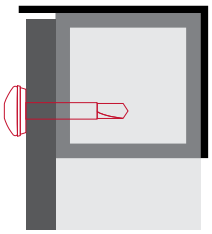
When using **CELLON®**, **MDF 19mm** or **OAK PLYWOOD**, the railing fulfills only the break-through safety, but not the fall protection of the railing. For this reason, an additional metal frame construction is required. In this case, it is recommended to use a square tube to which the panels are fixed. The dimensions of the profiles for the frame must be defined by the executing craftsman.

Handrail End Variant

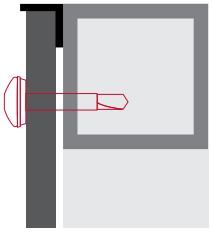
Without handrail

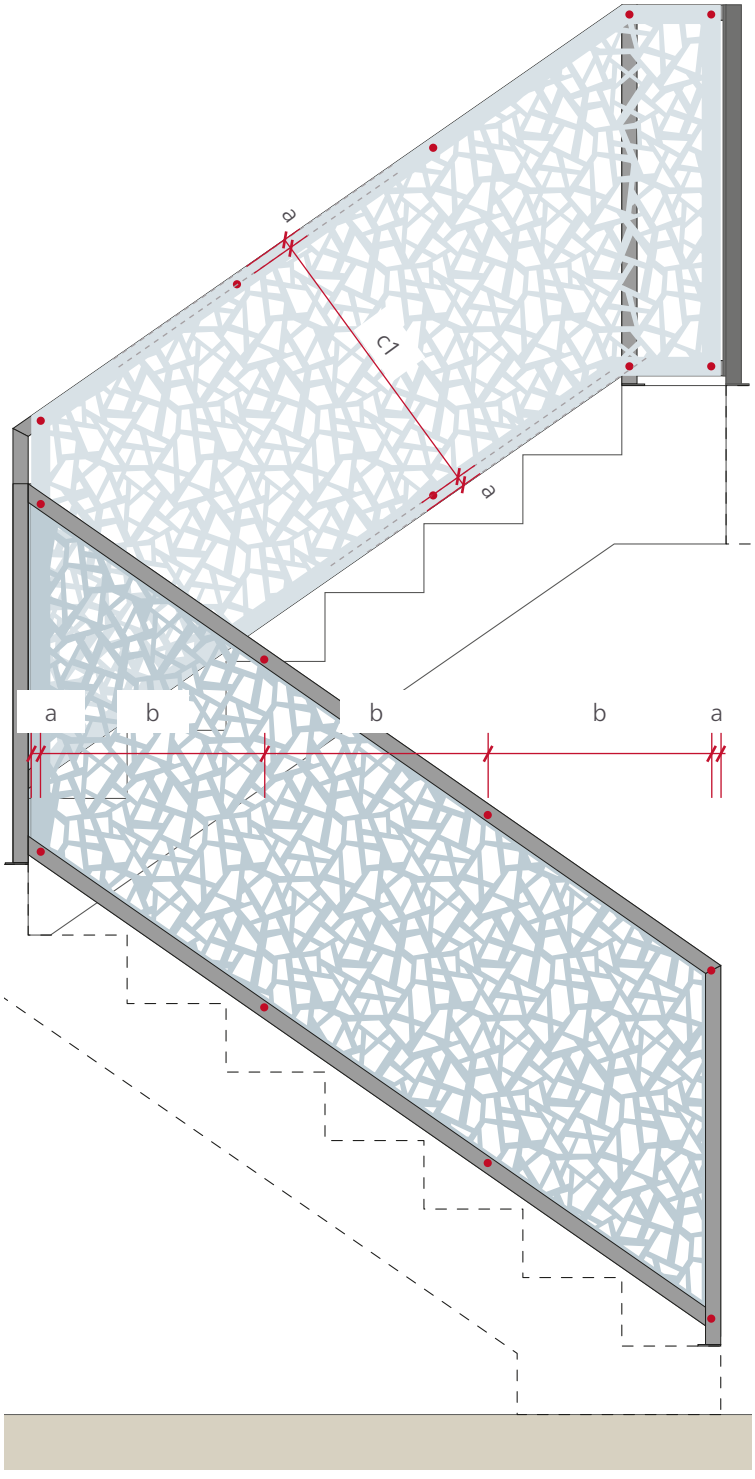


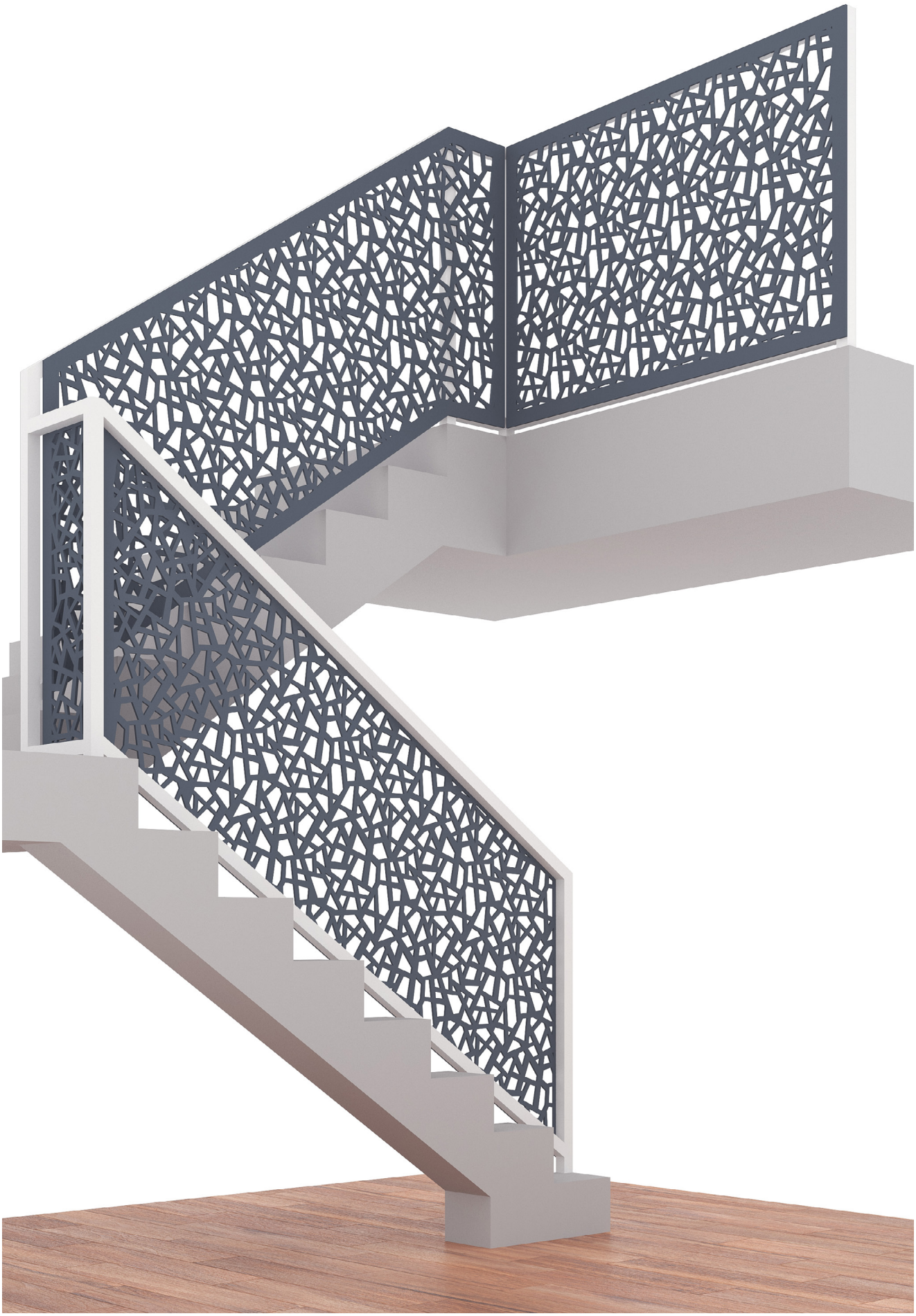
With front edge



With L-profile





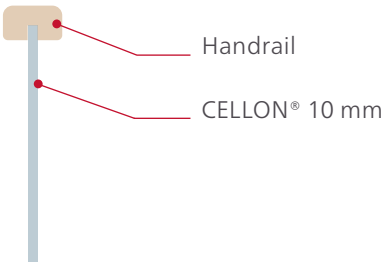


Construction Solutions 04.

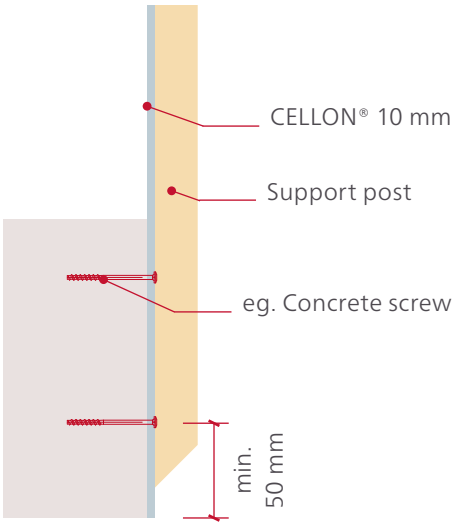
Stair Railing with Supporting Posts

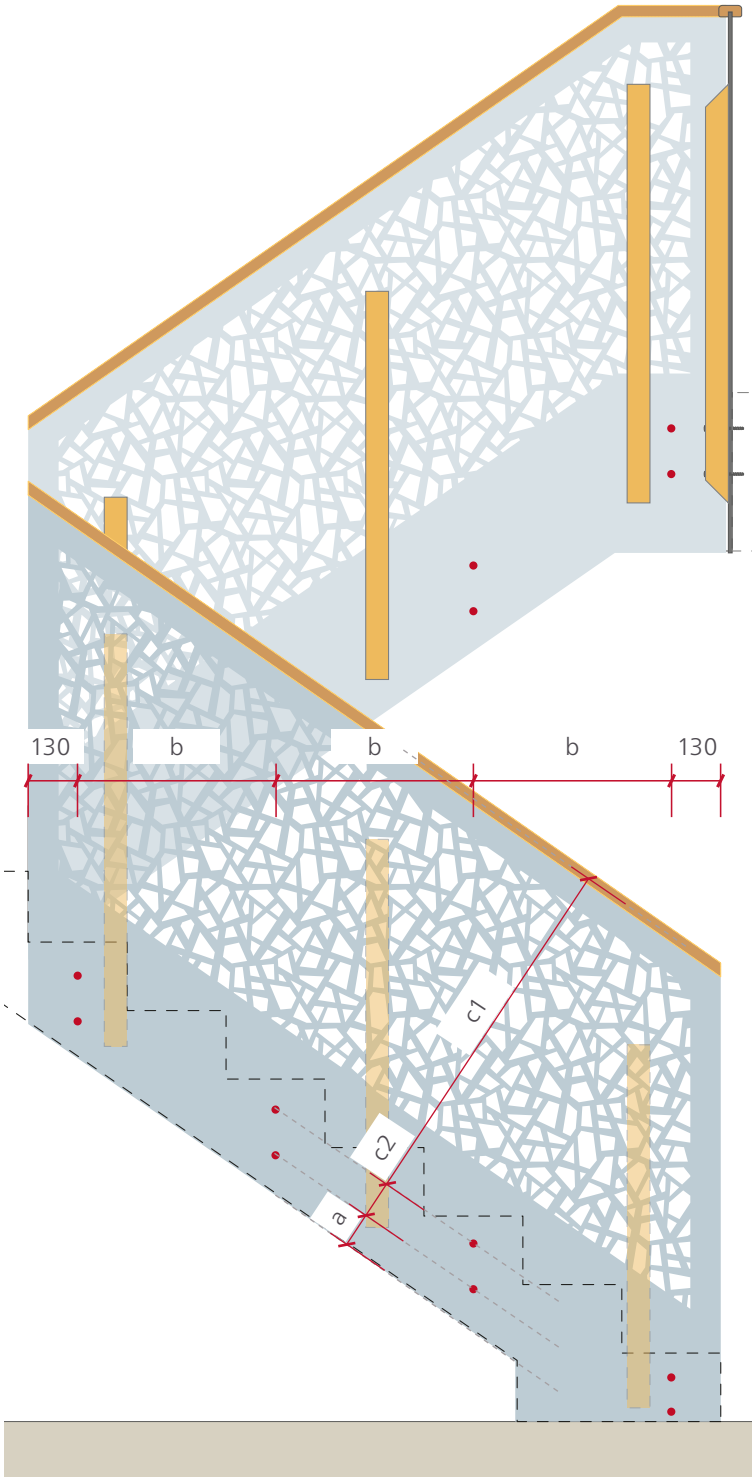
Railings made of **CELLON® 10mm** are very suitable for filigree perforations. The patterns come out very nicely this way. In addition to the surrounding metal frame, a construction of support posts in solid wood or metal can also be used. The distance between the posts must not exceed 1000 mm horizontally. Suitable fasteners as well as the number and spacing of the posts are to be defined by the executing craftsman. For a pleasant touch, an attached handrail is recommended.

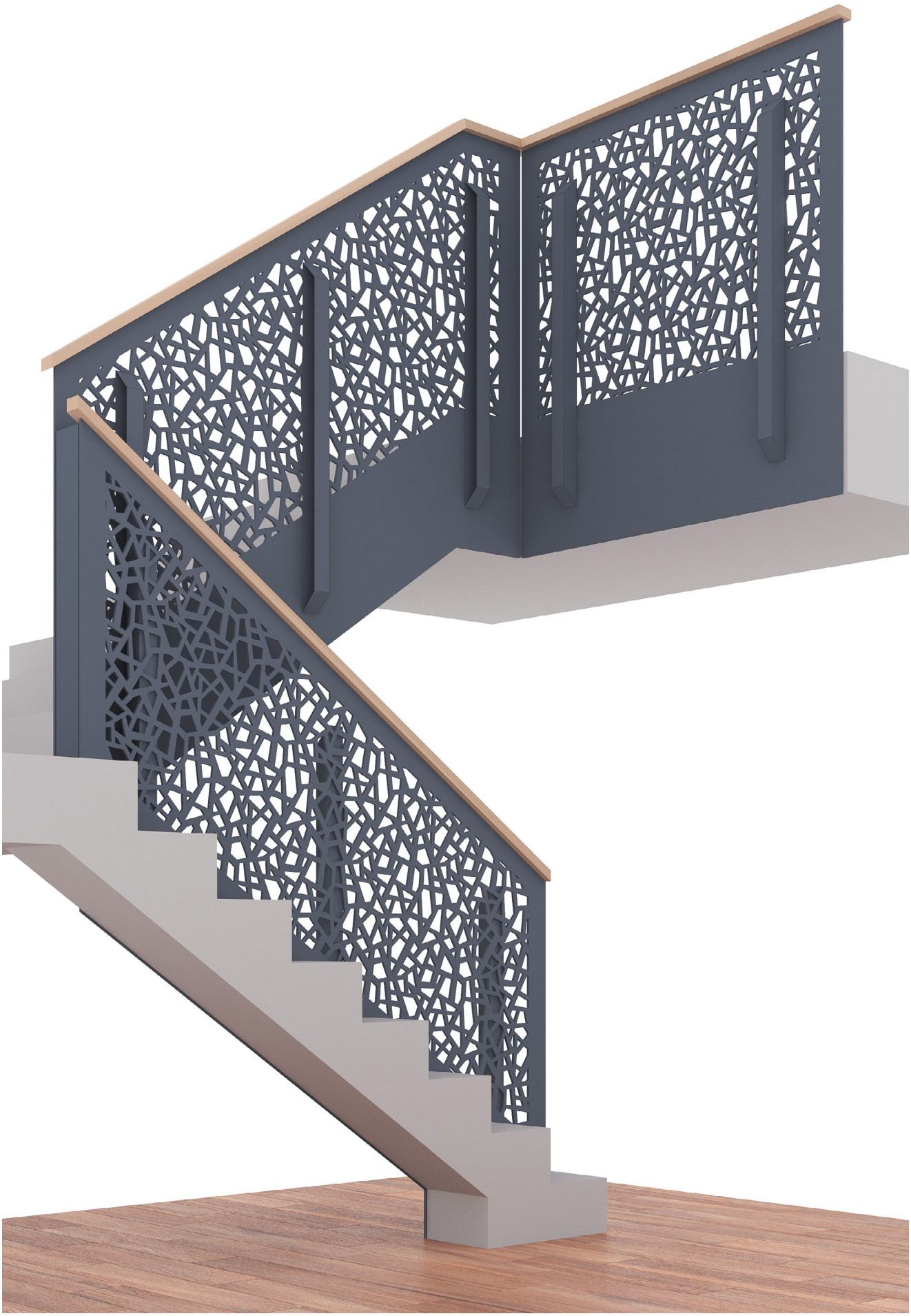
Handrail



Fastening on concrete







Additional Details 05.

Panel Connections

Lamello for MDF

In the case of multi-part elements made of **MDF** and **OAK PLYWOOD**, **Lamello** connectors can be milled into the panel joints. A depth of 12 mm is required on each side for the milling. The pattern has sometimes to be adjusted slightly at these points.

Steel bolts for CELLON®

For multi-part elements made of **CELLON®**, 12 mm long **steel bolts** can be drilled in at the panel joints on the face side. This ensures that the panels are always in the same alignment.

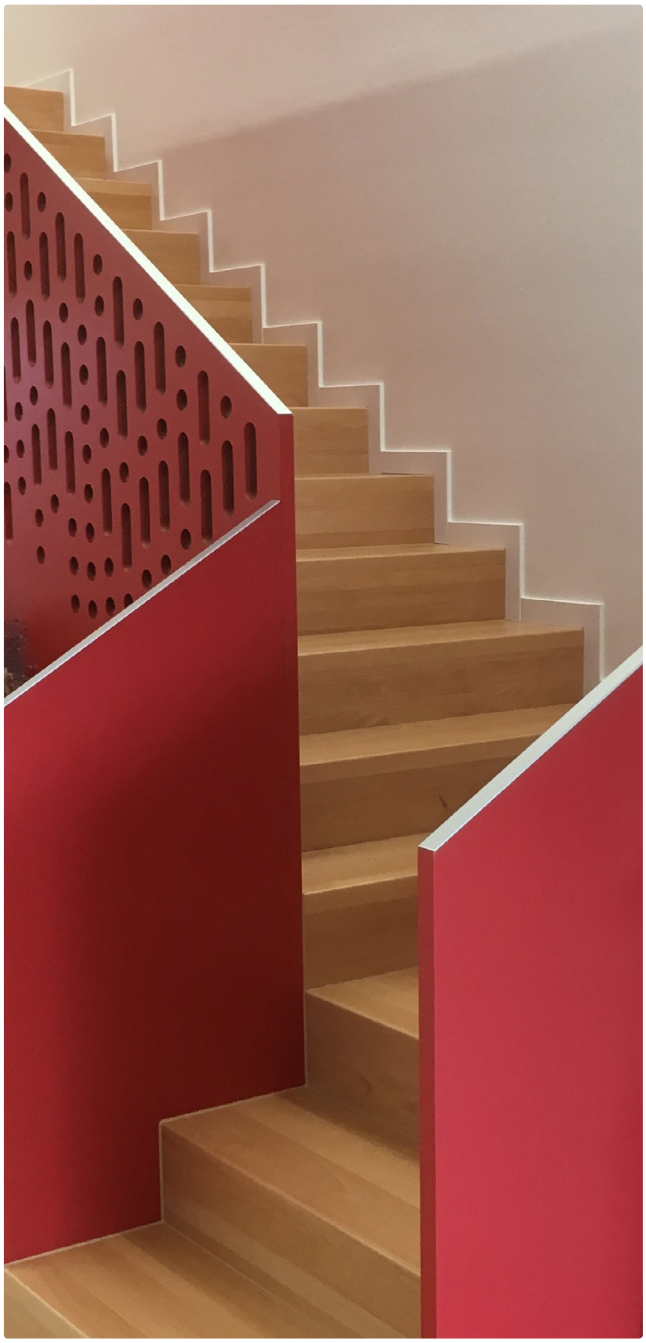
Additional Details 05.

Edge Characteristics

The edges turn black due to the laser cutting. A shimmering through of the black laser edge cannot be completely avoided with light colors, especially in acute-angled perforations. Slight puncture points from the laser are visible in the perforations. This is a product characteristic and therefore no reason for complaint.

Our outer edges are not post-processed manually. This means that certain unevenness may occur with MDF 19 and 30 mm.

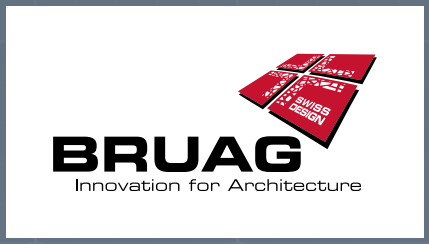
It is therefore recommended to make a handrail or an aluminum T-profile as an edge finish that can be obtained from us. We would already prefabricate the grooves for the T-profile.



Design

06.

You can find the entire **perforation collection** in our catalogue.



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