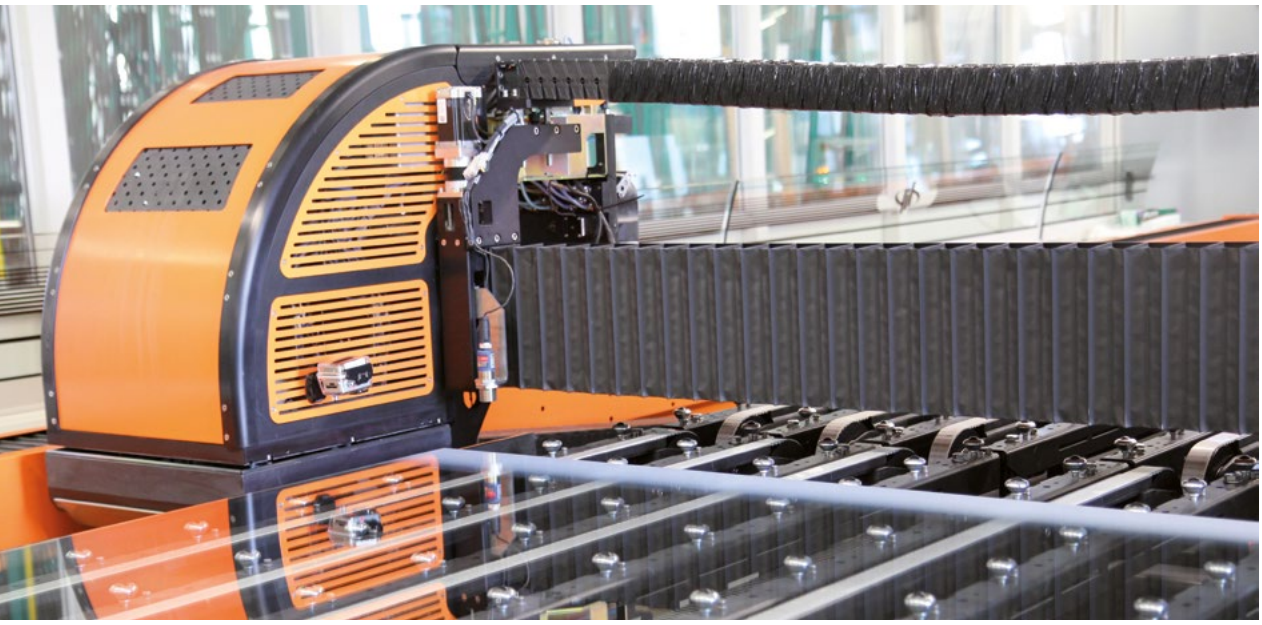
THIELEGLAS
TRANSPARENT INNOVATION.

Glass Design by Digital Printing

TG-PRINT*digital*

Product information Requirements Application Possibilities

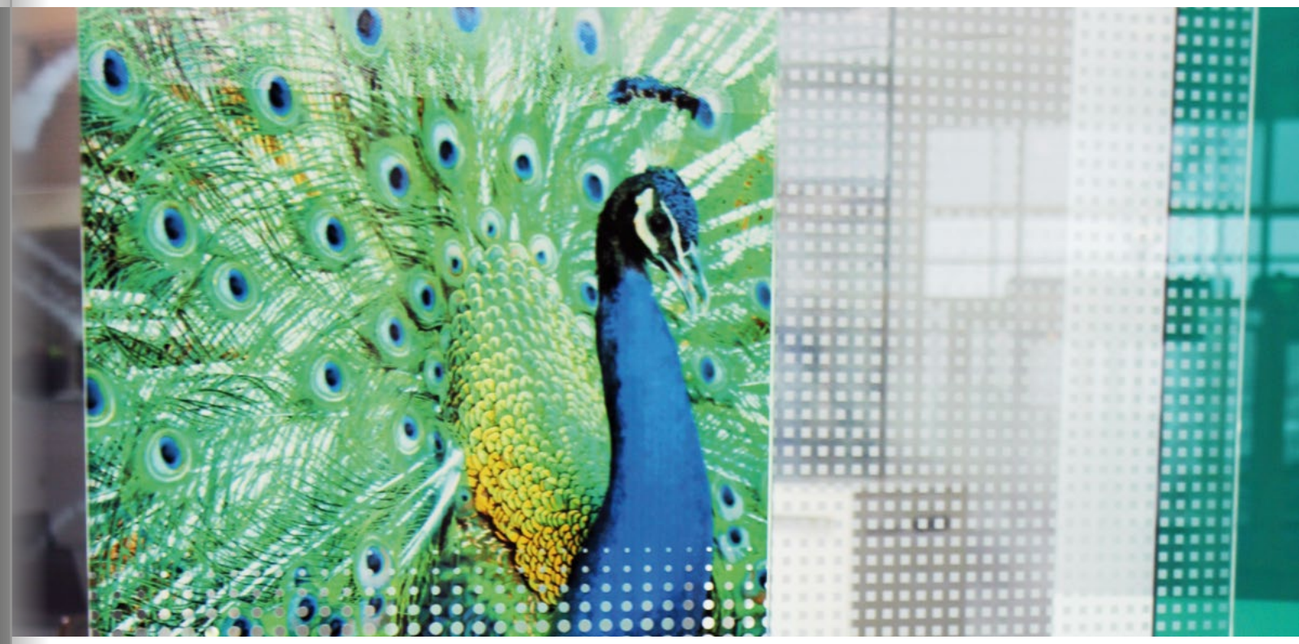


TRANSPARENT INNOVATION.

Instructions and General Information

Digital printing on glass is a unique printing technology which allows individual scope for designs and fields of application for multifunctional flat glass. Irrespective of the panel size and quantity the printing process can be adapted to special needs and requirements of the customer. Digital printing on glass sets individual colorful accents for interior and exterior design. You can freedly decide whether you want to print a standard decor or your favorite design in a photorealistic quality. The opportunities are unlimited. Please discover the fascination „color on glass“ on the following pages.

The data and information indicated in this brochure describe conditions, requirements and examples of use for ceramic digital printing on glass. The aim is to provide the best possible information on our product TG-PRINT***digital*** and its opportunities in terms of application. The allocation of important information concerning the data provision and processing is an essential and central component of this manual in order to achieve the best possible printing results.



1 Digital Printing Technology

Since 2009 Thiele Glas produces digital printed glass. For several years this is also possible in the maximum dimensions of up to 3210 x 18000 mm for the highest demands. Our machine manufacturer Dip-tech is one of the leading suppliers for high-tech printing machinery. We currently own several Jumbo GlassJet machines for the production of large format, digitally printed glass panes. In order to stick to the latest technology, the systems are regularly adapted to new requirements and improved.

Digital printing is particularly suitable for photo printing, in which individual glass is printed with various motifs.

These motifs can contain dots, stripes or checks, in addition to classic photo elements. Black and white motifs, multi-colored prints, but also a combination of motif and font is possible.

In the screen printing process, a seperate screen is made for each motif. Therefore, it is especially suitable for larger quantities with the same decor. The printing can also be done with metallic shades or optionally with a non-slip decor (e.g. TG-STEP). The maximum dimensions are 2550 x 6000 mm.

	Organic printing process	Anorganic printing process
Printing ink	inks consist mainly of resins and organic pigments	ceramic colors, which consist largely of finely ground glass, pigments and inorganic components
Color spectrum	large, many colors can be realised	limited, not all colors can be produced
Adhesion of the painting	exclusively by adhesion to the surface which signifi-cantly reduces scratch resistance	colors are fired into the glass during the tempering process, the color can pratically no longer be removed from the glass without destroying it
Field of application	only for interieur use	for interieur- and exterieur use

Technical data TG-PRINT*digital*

Glass types:	TG-ESG®, TG-TVG®, TG-ESG®-H
Glass thickness:	4 - 19 mm
Maximum glass dimensions:	3210 x 18000 mm (larger on request)
Minimum glass dimensions:	100 mm x 280 mm (smaller on request)
Maximum pane weight:	2800 kg
Maximum printing resolution:	1440 dpi
Printing ink:	ceramic ink
Colors:	6 basic colors freely mixable

2 Advantages of Ceramic Digital Printing

Advantages of TG-PRINT*digital*

- printing size up to 3210 x 18000 mm (larger on request)
- no screens necessary
- high-resolution photo-quality printing
- appropriate for single panes and large series
- combinable with various Thiele Glas products (basis is always TG-ESG®, TG-ESG®-H or TG-TVG®)
- all inks are free of heavy metals
- silicon bonding can be faciliated by screen printing or enameling (printing size up to 2550 x 6000 mm)
- individual color system, extensive range of colors and effects
- finer surface compared to screen printing
- better printing quality
- test reports are available for the application of structural glazing elements bonding according to ABg Z-70.1-75 and structural glazing as per ETAG 002

Apart from our traditional screen printing process (organic and ceramic), which limits creative possibilities, we also offer the modern digital printing on flat glass. For both, ceramic screen and digital printing, the glass is tempered after printing, the ceramic inks are melted and fired into the glass.This process gives the applied ink a long-lasting brilliance in terms of color reproduction as well as high durability and resistance to external influences. The appropriate printing method depends on your intended purpose, future application and the required colors and design.

With the digital printing process, the ink is printed directly from the printer onto the glass, which eliminated the need of screens. This offers above all time savings through shorter lead and production times and the possibility to bring elaborate photorealistic motifs onto glass. With the six basic colors, a wide range of colors from different color systems can be mixed and printed. In contrast to organic colors, where the color spectrum is limited. This is related to the components and the composition of the colors. They are also suitable for outdoor use.

Chemical and wheathering resistance

Every ceramic glass system can be attacked more or less by environmental influences. The intensity of the offensive by atmospheric influences does not exclusively depend on the material composition of the ceramic system. The intensity of the adverse environmental conditions is also decisive.

The flat glass industry has adopted a series of standardized tests from the lacquer technology. With these tests it is possible to qualify and quantify the atmospheric attack on fired ceramic glass systems. In summary, it can be said, that in some cases a slight attack can be detected, if the tested ceramic colored enamel is inspected visually.

But in no case can be judged as „not resistant“. The use of ceramically printed glass directly on the wheather side is not recommended. When visually assessing the enamel through the glass side, which meets the common requirements, the tested ceramic colors are resistant.

UV-resistance

Ceramic colors consists of glass and an anorganic pigment system. Normally these are UV-stable metal oxides. Thus, ceramic colors are basically UV-resistant and lightfast.

3 Printing ink

Basic colors

red | green | blue | orange | black | white

The mixture of overprinting of the basic colors can create a variety of mixed tones based on color systems such as RAL, RAL design, NCS, HKS, Pantone or Sikkens. Slight color deviations are possible. In order to check the color brilliance and the color effect, we recommend to have a real proof sample printed before releasing the order. Please note that ceramic digital printing cannot be compared with the CMYK color system, as it is realized on paper, because it is based on different basic colors.

Printing with ceramic digital printing ink is largely scratch-resistant and acid resistant according to DIN. Furthermore, light and adhesion resistance correspond to the durability of ceramic building glass melting colors.

In order to achieve desired effects like higher color saturation, it is useful to back up the digital print with a correspondending color. We recommend to use bright colors in order to influence the appearance of the digital print as slightly as possible. The thickness and opacity of the colors can be individually adapted during the printing. We distinguish between the properties normal and bonding dense.

Advantages of ceramic ink

- permanent applied on the glass
- no blistering of the ink
- scratch and abrasion resistant, resistant to moisture
- free of heavy metals
- long lasting brilliance (colors are translucent and not transparent)

4 Requirements on Digital Data

The print motifs are often provided by our customers. Alternatively, we also offer to provide templates from the image platform stock.adobe.com. Furthermore, it is possible to choose from a variety of patterns in our Pattern Catalogue or from templates in our image database. Our pree-press department checks the usability of the data in every case.

The print motif provided by the customer should be optimized in terms of resolution as well as size and color (best possible scale 1:1, for large facades/files in consultation with us also scale 1:10). Please note, that different color rendering effects may result depending on the type of glass. In this connection especially raw material batches, ink thickness, tempering conditions and other are very important.

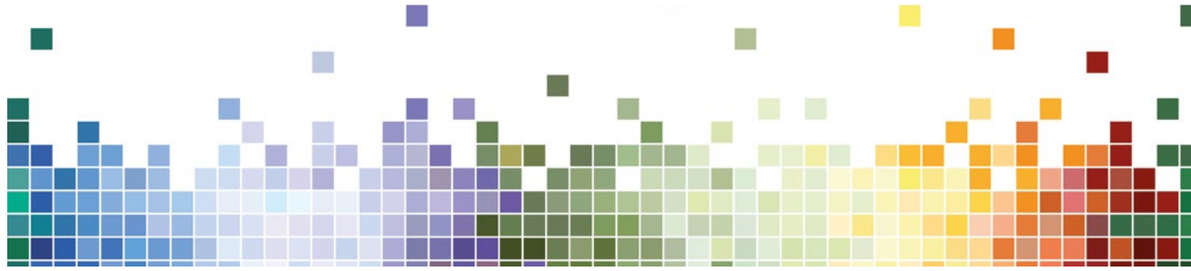
Upon customer request, an approval sketch and/or an image section in real resolution can be sent by email for approval of the customer before printing the motif.

We also offer the possibility to get a real printout in European A4-size (210 x 297 mm) on glass. The customer can check the color rendering and the resolution on the basis of this pattern and inform the prepress of any changes. The general rule is, if data providing for sampling differs from the main order, deviations in color must be expected. In order to avoid these discrepancies between sample and final order, it is absolutely important that the final data is already available for sample. We would be pleased to support you in terms of data supply or any other question.

File formats and data supply

Source of the print motif:	provided by customer, stock.adobe.com, Pattern Catalogue, Thiele Glas image database
File types pictures:	all common graphic formats (PDF, PSD, EPS, TIFF, BMP and JPEG)
File type vector graphics:	vector formats (EPS, AI, PDF)*
Fonts:	except for standard fonts (Arial, Calibri, Verdana, etc.) all special fonts have to be converted into paths, so that no substitute fonts are integrated.
Recommended resolution:	from 72 dpi (highest resolution prefered – depends on motif)
Data supply:	USB-Stick, CD/DVD, FTP upload, email (max. 10 MB), data link

* If the vector graphic was created in AutoCAD, the file has to be exported into one of the indicated formats to avoid the loss of data. Please note, that your file need to be able to be opened by all common graphic programs (also previous program versions). All data will be checked for printability by our experts.



5 Pre-press

In order to achieve high-quality printing results, comprehensive know-how and a perfectly coordinated team are necessary. In our pre-press department, we not only check your data for usability. We also advise you in regarding feasibility and adapt the files to your ideas by using our experience and expertise we collected over years. Service and the best possible print image are most important for us. We are looking forward to help you if you have any queries or questions.

Please note, that the quality of a low-resolution inferior file cannot be improved. We are only able to optically upgrade such files with the help of software adjustment like color saturation or gradation.

In order to give you an understanding of our work in the pre-press department and the general proceeding in the event of an order, we have summarised the steps of work starting with the data supply up to the printing itself.

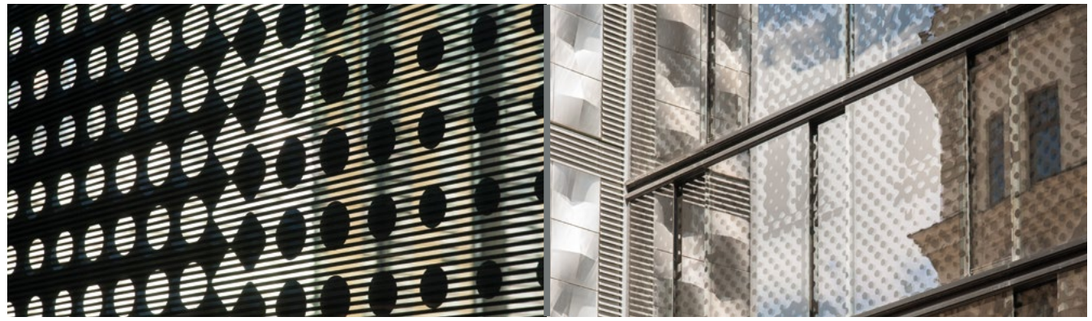
Workflow pre-press

1. data supply by customer
2. checking size, resolution and colors of the file
3. data preparation – scaling the motif to the valid print format
4. customer receives a pdf-file as a print review with visualization of any subsequent print resolution, on request
5. creating of printing sketches for printing staff
6. machine settings (color adjustments, tonal correction)
7. printing of prepared file

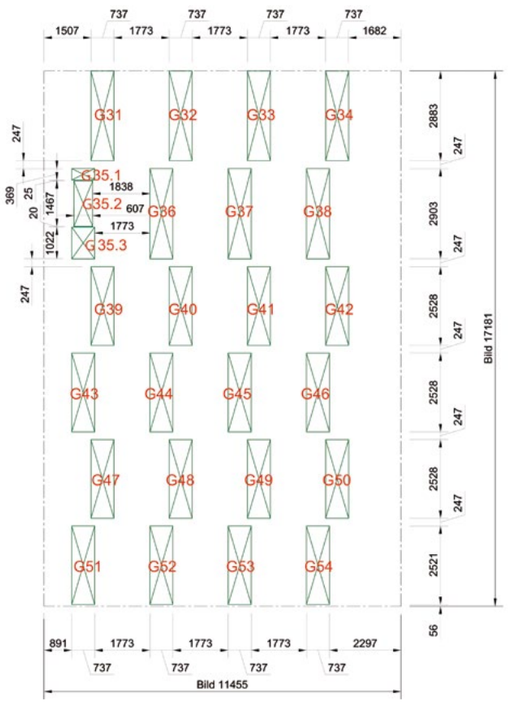
6 Modification of Printing Designs for Facades

For the realization of large-format digital print motifs and their correct assembly of the glass panes to finish the final motif, the image is divided into corresponding parts and marked. For the visualization of the processes in the pre-press you will find a project example with detailed information below.

At the reference object „Höfe am Brühl“, a mordern shopping center in the heart of Saxony´s metropolis Leipzig (Germany), Thiele Glas produced over 2900 m² digital printed insulating glass with more than 700 different printing designs. The large-size motif of a historic building, that used to stand at the same place, is now decorating the modern glass facade of the shopping mall.



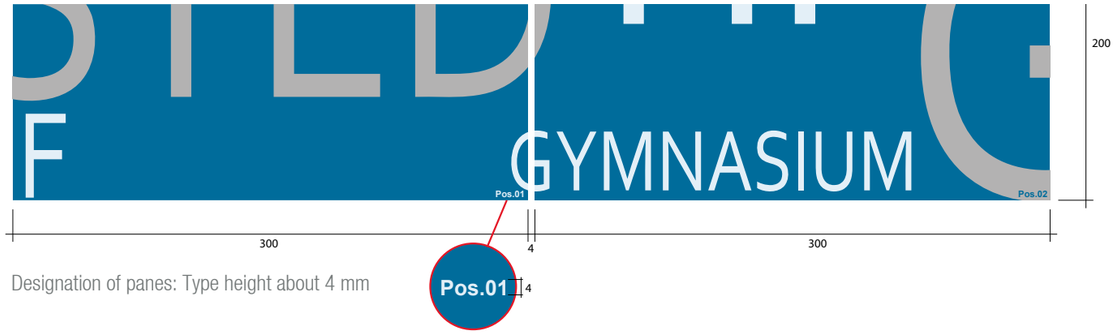
If images or graphic are divided into several panes or whole facades, a complete file and a cutting plan including dimensioning of the individual panes are required. Here with the example of „Höfe am Brühl“ (Germany): Therefore, the image was digitally divided into several parts and every pane was labeled with its position within the facade in order to assure a simple and correct assembly.



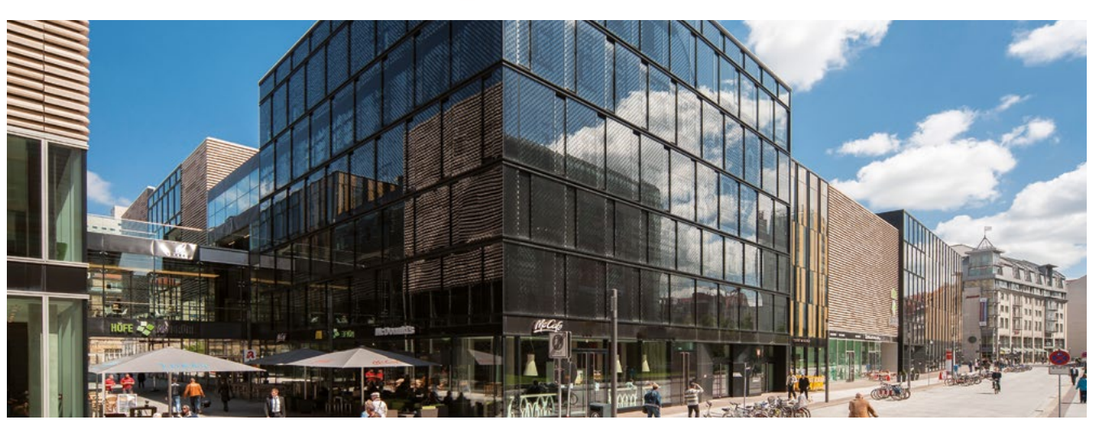
6 Modification of Printing Designs for Facades

At the customer´s request, a labeling of the pane can be printed into the motif.

Thus, the glass can be more easily assigned during installation, visualized here with an example.



Designation of panes: Type height about 4 mm



Project information „Höfe am Brühl“ Leipzig, Germany

Completition:	Oktober 2012
Principal:	mfi management für immobilien AG
Executing company:	Max Bögl Bauunternehmung GmbH & Co. KG
Facade construction:	Lindner Fassaden GmbH, Arnstorf
Architect:	Grüntuch Ernst
Glass types:	TG-THERM®*plus* UN, TG-PRINT*digital*, TG-PRINT
Internet:	www.gruentuchernst.de www.hoefe-am-bruehl.de

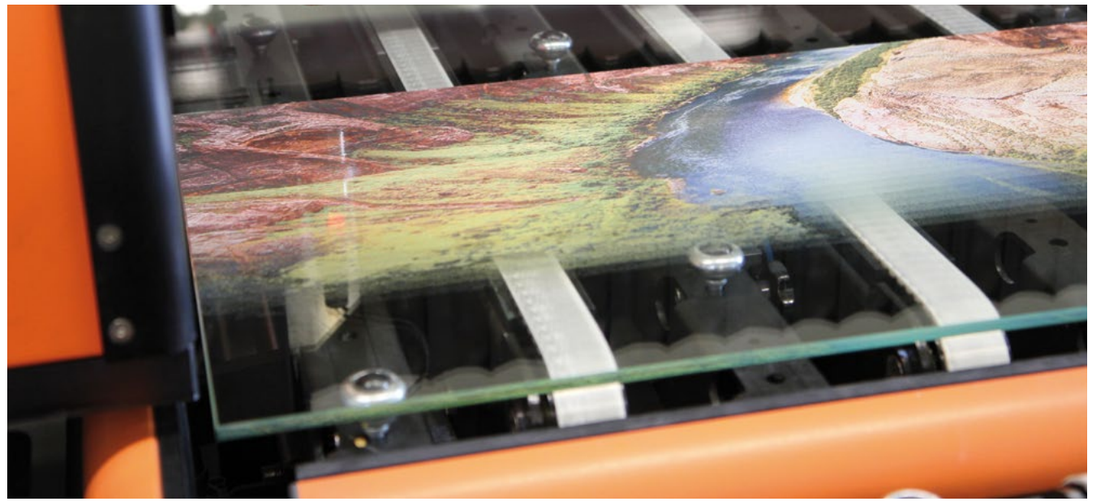
7 Fields of Application

The application possibilities of digital printed glass are nearly limitless. Whether in luxurious design interior, as a colorful eye-catcher for facades or for the individual design of your own for walls with motifs from life.

Let your creativity run wild with digital print motifs on glass. We have summarized a selection of application exampled for you below. Convince yourself and see how diverse glass can be!

Areas of Application

- facades
- showcases
- glass curtains
- room divider
- doors and partition walls
- showers and bathrooms
- glass tiles
- kitchen back panels
- kitchen work tops
- counter fronts
- tables
- advertising- and information boards
- wall coverings
- ceiling elements
- balcony glazings
- wine cabinets
- aquariums and terrariums
- glass images and wall decorations



7 Fields of Application | Facades

Facades with digital printing are very impressive and arouse curiosity from afar. The Ezinge education park in the Netherlands stands out for its brilliant colors and an exciting motif with a kaleidoscope effect.

The facade can be provided with an additional layer of ceramic enamel in white. This obscures the masonry and enhances the brilliance of the colors.

Project information

Construction period:	2013 – 2014
Principal:	Woonconcept
Facade construction:	Si-X, Benthuizen
Architect:	building: Atelier PRO architekten, Den Haag (Netherlands) art facade: Driessen + Van Deijne, Amsterdam (Netherlands)
Glass types:	TG-PRINT***digital*** (Pos. 2) on TG-PROTECT®TVG / TG-EMAILLE
Glass volume:	560 m²

7 Field of Application | Roofs

With motifs or lettering printed on glass, roofs become eye-catchers. On the „Romano-Guardini-Platz“ in Mainz (Germany), a roof glazing with multilingual lettering was used.

The roof area extends over 120 m² and consists of a graphic, which was divided into 20 individual panes. Thus, each pane is unique.

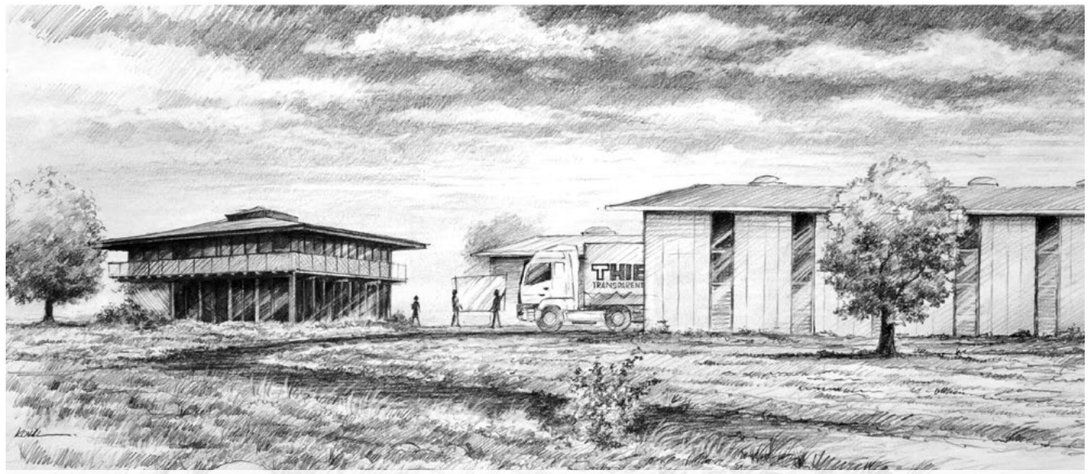
Project information

Completition:	2013
Principal:	PMG, Parken in Mainz GmbH, Mainz
Executing company:	Alberti Metallbau GmbH, Mainz
Architect:	Heinrich Lessing, Architekt BDA, Mainz (Germany)
Glass types:	TG-PRINT***digital*** on TG-PROTECT®TVG
Glass volume:	120 m²
Dimensions:	2400 x 1500 mm

7 Fields of Application | Partition Walls

Partition walls are mainly used in large rooms to give them more structure. Individual areas can be separated from each other optically, acoustically and also energetically. But they are also often used for decoration.

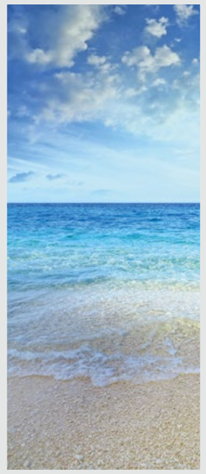
At one of our sites, a partition wall was equipped with digital printing. This partition wall consists of different panes and shows a drawing of the location.



own motif

final result

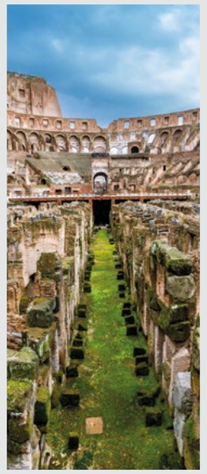
further impressions for the design from our image database:



sandy beach

cornfield

ladybug



Colosseum Rome

butterfly

Eiffel tower

Find your desired motif.

7 Field of Application | Kitchen back panels

Printed kitchen back panels are robust and set colorful accents. The standard tile mirror solution is gradually being replaced by an individual back wall design, that matches the colors of the kitchen furniture.

In areas, where greae, water and sauce splashes damage the wall, printed glass kitchen back panels offer an ideal and, above all, hygienic solution.

coffee bar 2

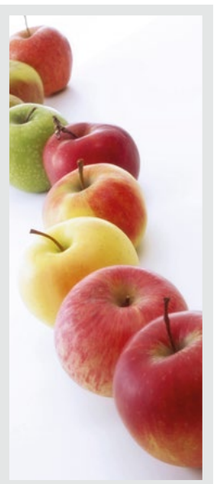
own motif

final result

final result

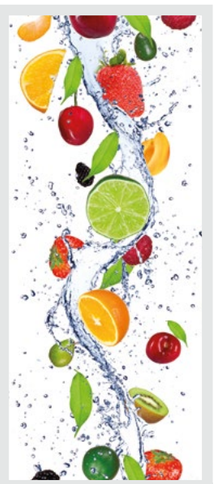
further impressions for the design from our image database:

spices



apples

kiwi



multifruit 3

vegetables

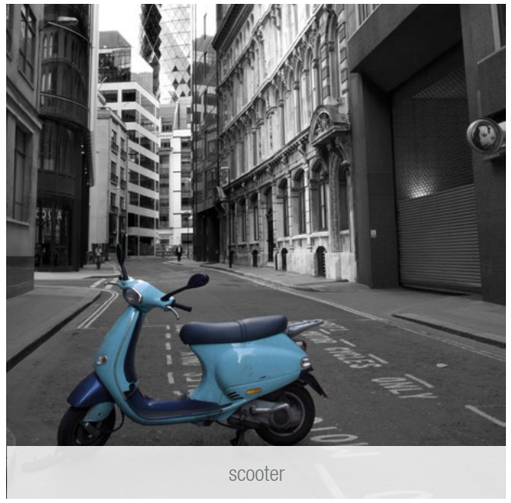
pasta

7 Fields of Application | Glass curtains

A special decorative element is the printed glass curtain. It completely replaces the classic fabric curtain and also offers a light and privacy protection. Particularly suitable are motifs from nature and urban motifs.

For example, you can imitate the view out into the forest or onto the street. Depending on the light incident and time of the day, you will get a new picture experience.

London


scooter


final result


final result

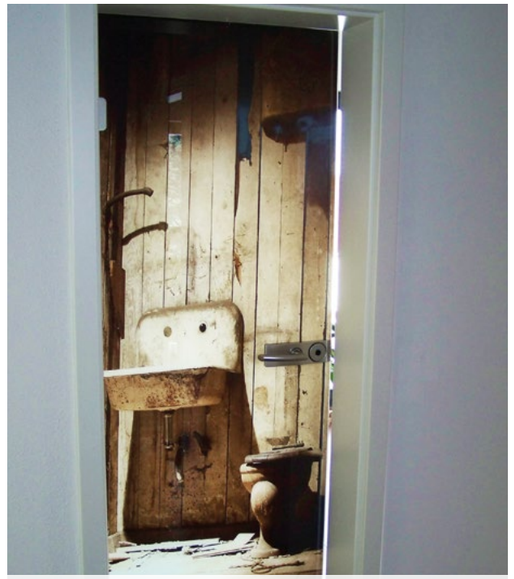
7 Fields of Application | Glass doors

Glass doors are particularly suitable for rooms that have little light. They connect rooms through transparency and light permeability. Even small rooms seem so larger and more enjoyable.

In addition to natural motifs, images that are thematically based on the space behind are also suitable. Gain an impression of both variants in our following application examples.


toilet

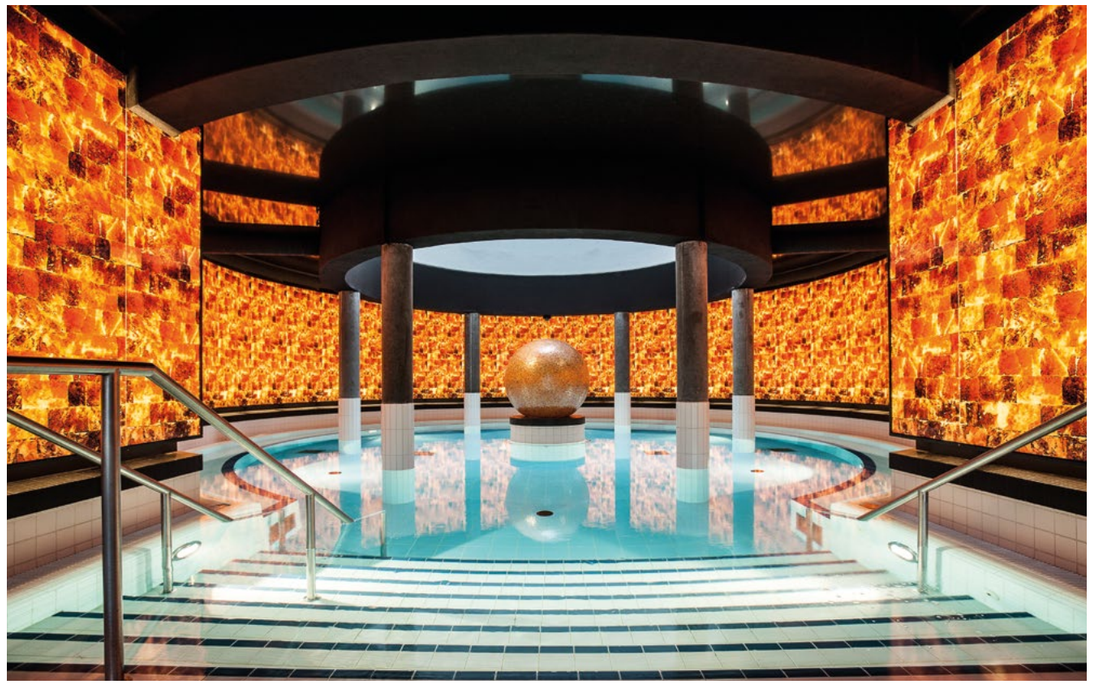

sunset


final result


final result

7 Fields of Application | Wall coverings

Especially in the wet area it can be difficult to make the walls suitable and above all worth seeing. In the wellness oasis Scoul in Switzerland, digital printed glass was therefore used as wall coverings. The atmosphere created by the colored glasses fits harmoniosly into the overall picture of the sole surrounding.



Project information

Completition:	2012
Principal:	Bogn Engadina Scoul (BES) SA
Executing company:	Rauch Metallbau AG, Xglas AG
Architect:	Michaela Reichwald
Draft and planning:	Geplan Design Planungsgesellschaft mbH
Glass types:	TG-PRINT*digital* on TG-PROTECT®TVG
Glass quantity:	38 panes

7 Fields of Application | Elevator glazing

Most elevator glazings are very grey and dull and are hardly noticed by the viewers. That won´t happen in Aarhus, Denmark. The glazing was provided with a colorful digital print.

Due to the colorful design, the elevator exudes lightness and warmth instead of the usual cold flair.

Project information

Completition:	2016
Principal:	Bygningsstyrelsen
Executing company:	H+ Arkitekter, Kopenhagen
Artist:	Marianne Gronnow
Glass types:	TG-PRINT*digital* on TG-PROTECT®
Glass quantity:	86 panes
Dimensions:	up to 1300 x 2000 mm

7 Fields of Application | Art motifs

To make a building, a park or a room look unique, there are various decorating options. Here, it is worthwhile to use digital printed glass, too.

One example is the sculpture park in Neu-Ulm, which can be viewed in front of an office building. The motifs of the artist Kaeseberg are particularly prominent on the printed glass.

KAESEBERG: quellcode - doppelzeichen geometrie

Project information

Completition:	2015
Principal:	Schneider Geiwitz und Partner
Executing company:	Beck GmbH Stahl- und Metallbau, Cleebronn
Architect:	Trenk Oberdorfer Architekten, Illertissen
Artist:	Kaeseberg, Leipzig
Glass types:	TG-PRINT*digital* on TG-PROTECT®ESG
Glass quantity:	10 panes

further impressions for the design from our image database:

wall 5

rose on marble

jungle

abstract background

sketch truck

vector drawing of little birds

7 Fields of Application | Bird protection glass

In order to prevent a bird strike and thus protect the animals and the glass, digital printing is also used for bird protection glass. Highly constrating lines in vertical or horizontal alignment are effective, but a pattern of cots can also be used.

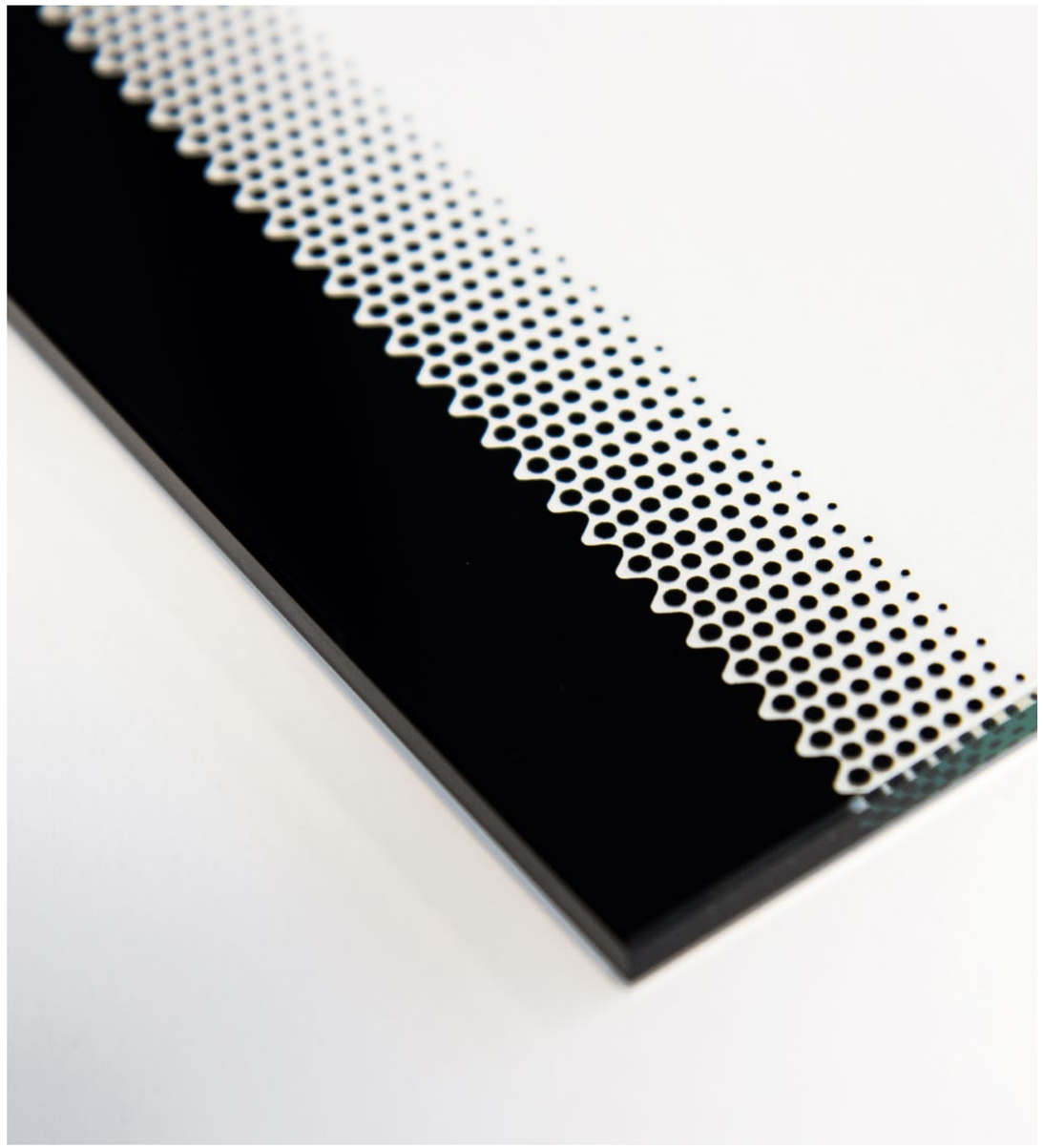
Small details are great of importance, as even small deviations in thickness or size, in the distances or in the color can achieve differences in the effects.

Project information

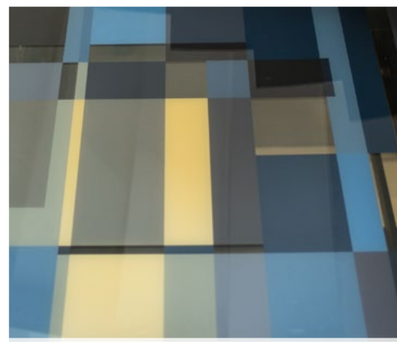
Completition:	2020
Principal:	Wohnungsgesellschaft Stadtbau GmbH, Freiburg
Executing company:	Winterhalter & Maurer GmbH
Architect:	mbpk Architekten und Stadtplaner GmbH
Glass types:	TG-PRINT***digital*** on TG-PROTECT®***color***, TG-THERM®***plus***
Glass quantity:	24 panes
Dimensions:	up to 1265 x 2850 mm

7 Fields of Application | Peripheral digital printing

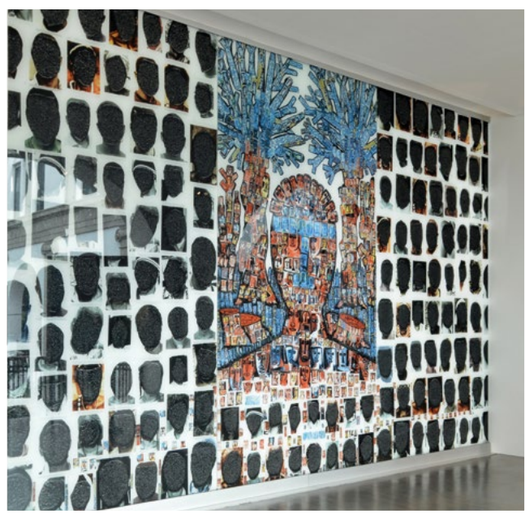
The digital printing process can also be used for peripheral digital printing. Often something is concealed with a peripheral digital print. The main fields of application are therefore mainly the bonding of fire protection doors, the steps in step glass or the spacers in insulating glass. For an optically softer corner, the edge digital print can also be provided with an outgoing dot grid.




AKADEMIE DER KÜNSTE




1828
EDUARD
MÖRIKE




bad neustadt an der saale
e-bike

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on www.thiele-glas.de/en


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HAUS

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