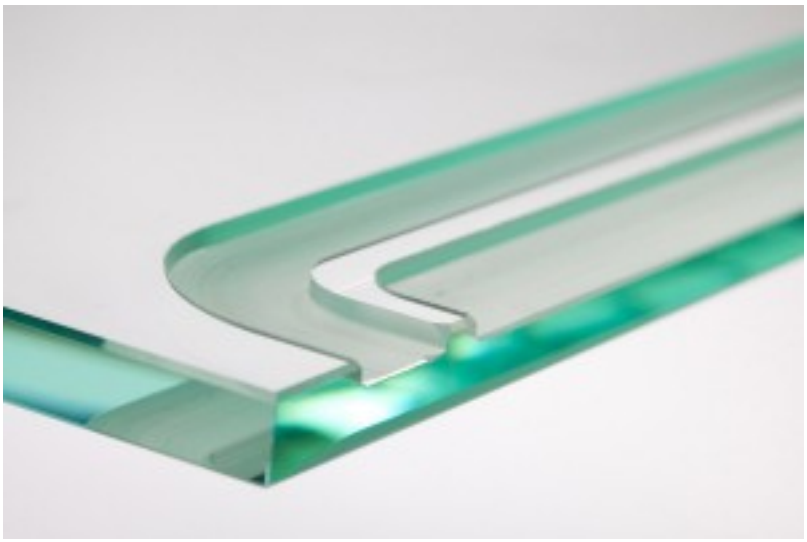
Digital glass processing



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Dubiel Vitrum offers a wide range of float glass processing services using digitally-controlled equipment.

Advantages of digitally-processed glass:

- high quality
- shape precision and repeatability
- visual attractiveness
- safety

CNC processing services offered:

- cutting glass and mirrors
- grinding and chamfering glass
- drilling holes

Cutting glass and mirrors

Glass is cut automatically or in special cases manually.

TECHNICAL TERMS OF REFERENCE FOR AUTOMATIC GLASS CUTTING at Dubiel Vitrum

glass thickness	2 - 30 mm
maximum pane size	4,000 x 2,500 mm **ATTENTION:** we most often cut 3,210 x 2,250 mm or 3,210 x 2,550 mm panes
cutting precision	±0,25 mm
shapes	any – taking into account the detailed minimum and maximum size limits for the giv thickness, necessary in later processing
Pattern scanning	We scan patterns created by customers to reproduce shapes accurately. Requirements: • patterns must reflect the outline of the object – drawn shapes cannot be sca • holes on patterns have to be at least 15 mm in diameter • scanning precision depends on the quality of the pattern edge

TECHNICAL TERMS OF REFERENCE FOR MANUAL CUTTING at Dubiel Vitrum

minimum glass thickness	2 mm
maximum glass thickness	• 19 mm – for monolithic glass cut with a glass cutter • 35 mm – for glass cut with a saw (both sides)
maximum pane size	2,250 x 1,600 mm
cutting precision	±1.0 mm
curve cutting	Maximum circle and curve radius: 2,000 mm

We also cut special glass, such as:

- ornamented glass

- laminated glass (VSG)

In addition, we cut glass materials other than float glass, e.g. glass pipes (using a diamond saw).

Grinding and chamfering glass

Edges are processed by means of grinding and chamfering machines, as well as on processing stations.

In special cases, manual processing using a diamond or stone disc and a manual bandfacer is required to dull corners, chipped spots, and blunt damage, as well as refine edges, produce chamfers, or prepare pieces for further processing.

Types of glass edge processing at Dubiel Vitrum

flat cut

angled cut

triple cut

chamfer

double chamfer

two-sided chamfer

semicircular cut

full semicircular cut

OG cut

OG2 cut

TECHNICAL TERMS OF REFERENCE FOR EDGE PROCESSING at Dubiel Vitrum

glass type

- float monolithic
- laminated non-tempered
- ornamented

Types of glass edge processing at Dubiel Vitrum

cut type	• painted with non-glaze paint • flat cut of straight sections • 0-45° angle cut of straight sections • triple cut of straight sections • blunting of straight sections
cut finish	• mat • polished
glass thickness	3-90 mm
minimum glass size	• 40 x 40 mm – for flat cuts and 6 mm thick glass • 50 x 50 mm or 40 x 80 mm – for flat cuts and 8-19 mm th • 110 x 110 mm – for cuts at 0-22.5° angle and up to 19 m • 140 x 140 mm – for cuts at 22.5-45° angle and up to 19 m
maximum glass size	• 3,210 x 3,500 mm • maximum width: 3,800 mm or maximum height: 3,650 m • maximum weight 250 kg
maximum chamfer size	5 mm – chamfer at 0-45° angle (adjustable)
minimum edge size	1 mm (for angled and triple cuts)
parameters for triple cuts	• glass thickness *S*: 3-90 mm

Types of glass edge processing at Dubiel Vitrum

- edge width *c*: from 1 mm to *S*
- angle *a1*: 0-45°
- angle *a2*: 0-45°

ATTENTION: angle *a1* < **angle** *a2*

TECHNICAL TERMS OF REFERENCE FOR EDGE PROCESSING at Dubiel Vitrum

cut types and glass thickness

- flat (3-40 mm glass)
- semicircular (4-19 mm glass)
- full semicircular (15 and 19 mm glass)
- OG (15 and 19 mm glass)
- double OG2 (15 mm glass)

cut finish

- mat
- polished

minimum glass size	fi 230 mm
maximum glass size	fi 2,000 mm (up to 2,200 mm – needs to be consulted with Sales)

TECHNICAL TERMS OF REFERENCE FOR ROUNDING CORNERS at Dubiel Vitrum

minimum corner radius	5 mm
maximum corner radius	50 mm

cut types

- flat cut (mat and polished)
- semicircular cut (mat and polished)

glass thickness	3-19 mm

Types of glass edge processing at Dubiel Vitrum

glass size

- minimum: 100 x 100 mm
- maximum: 2,500 x 2,500 mm

angle of rounded corners 90°

TECHNICAL TERMS OF REFERENCE FOR CHAMFERING GLASS at Dubiel Vitrum

chamfer types

- standard chamfer
- double chamfer
- two-sided chamfer

chamfer finish

- mat
- polished

chamfer width 5 - 40 mm

maximum chamfer width depending on the glass thickness

- for 3 mm thick glass – 10 mm c
- for 4 mm thick glass – 25 mm c
- for 5 mm thick glass – 30 mm c
- for 6 mm thick glass – 35 mm c
- for 8 mm thick glass – 40 mm c

minimum glass thickness

- standard chamfer: 3 mm
- double chamfer: 5 mm
- two-sided chamfer: 6 mm

minimum glass size depending on chamfer width

- 40 x 40 mm – 10 mm chamfer

Types of glass edge processing at Dubiel Vitrum

- 50 x 50 mm – 15 mm chamfer
- 90 x 90 mm – 25 mm chamfer
- 110 x 110 mm – 30 mm chamfe
- 130 x 130 mm – 35 mm chamfe
- 160 x 160 mm – 40 mm chamfe

maximum glass height	2,700 mm

Minimum parameters for two-sided chamfer

glass thickness	6 - 25 mm
chamfer angles	3,5° - 45°
minimum edge width	1,5 mm

TECHNICAL TERMS OF REFERENCE FOR CURVED CHAMFERING at Dubiel Vitrum

processing types

- external curved chamfer
- internal curved chamfer
- linear chamfer

chamfer types

- standard chamfer
- two-sided chamfer
- double chamfer

finish

- mat
- polished

chamfer width	0.5 - 40 mm

Types of glass edge processing at Dubiel Vitrum

chamfer angles 0 - 45°

glass thickness 3 - 20 mm

minimum glass size

- 50 x 50 mm (glass processed using a pattern)
- fi 170 mm

maximum glass size

- 2,000 x 2,000 mm
- fi 2,000 mm

other terms of reference

- maximum straight section processed: 1,300 mm
- proportion of side lengths:

- not more than 1:3 for oval

- not more than 1:2 for rectangle

- hole size for internal chamfering: from fi 400 to fi 700 mm
- for chamfer widths up to 20 mm

- external curve radius: R > 25 mm

- cut-out radius: R > 50 mm

- cut-out depth: B < 40 mm

Drilling holes in glass

Holes are drilled used two drills: upper and lower. The drilling spot is determined when cutting or can be specified manually.

TECHNICAL TERMS OF REFERENCE FOR DRILLING HOLES IN GLASS at Dubiel Vitrum

processing type

- drilling

	• reaming
typical drill diameters (mm)	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 25, 26, 27, 3 45, 46, 50, 55, 60, 65, 70
reamers – countersink bits	• minimum ream diameter: 3 mm • maximum ream diameter: 72 mm • ream angle: 90°
glass size	• minimum: 60 x 60 mm (smaller glass sizes require using an additional grip) • maximum: 3000 x 2500 mm
glass thickness	3 - 50 mm
other	• the minimum distance between holes depends on the glass thickness, b be lower than 5 mm • the minimum distance from the hole edge to the glass edge: - glass ≤ 6 mm – 5 mm - glass ≥ 8 mm – 10 mm • we can produce glass circles • we can produce semicircular cut-outs alongside the glass edge

Glass processing at CNC processing stations

CNC processing stations are used for global glass processing. The basic operations are:

- cutting shapes, also irregular

- grinding edges
- drilling holes
- cutting large internal cut-outs and holes, also irregular

The advantages of the glass processed at CNC stations are its high precision, guaranteed shape repeatability in serial production, and attractive finish. The stations are used for large-sized pieces, both low- and high-volume, as well as batches of smaller pieces.

To complete a project, CNCs use files with a shape designed using various CAD applications. The quality of the glass pieces made on NC-controlled processing machines depends on the file format used in CAD software (dxf, dwg).

TECHNICAL TERMS OF REFERENCE FOR CNC PROCESSING at Dubiel Vitrum

piece size

- maximum size: 3,400 x 2,000 mm

ATTENTION: maximum piece size depends on the processing method and the tools used (e.g
disc diameters, milling head diameters, etc.).

- minimum size: 320 x 170 mm or fi 300 mm

glass thickness 3-55 mm

glass types

- monolithic
- laminated
- coated (mirrors, painted, with special coatings)

processing types **CUTS**

- flat (3-55 mm)
- semicircular (4-19 mm)
- full semicircular (15 and 19 mm)

- OG (15 and 19 mm)
- double OG2 (15 mm)

cut types:

- coarse
- mat
- polished

HOLES

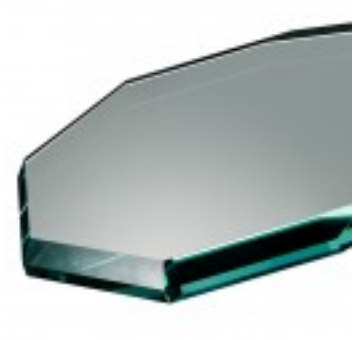
- drilled or milled and ground
- available drill sizes: Ø 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 25
- milling and grinding holes from fi 20 without restriction to rounded mm
- polishing holes from fi 50 mm
- conical deepening (reaming): fi > 60 mm

CUTTING INTERNAL SHAPES:

- minimum internal radius, mat: R = 8 mm
- minimum internal radius, polished: R = 25 mm

OTHER:

- maximum chamfer width: 5 mm



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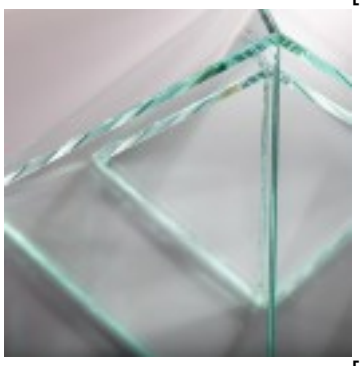

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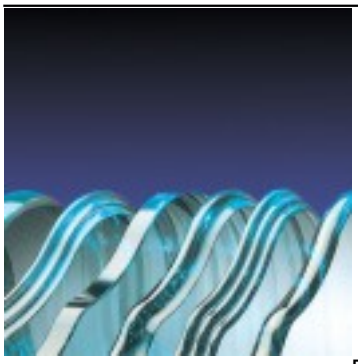

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