Counting grids

The types of counting chambers differ in counting grids and the depths of the chambers. Orthogonal lines form grids which become visible by magnifying them with a microscope. The grid of a counting chamber is engraved into the surface of its base.

Neubauer-improved

Nowadys the Neubauer-improved counting chambers has become the most popular one.

Its standard depth is 0.1 mm. The grid consists of 3 x 3 large squares with areas of 1 mm² each. The large square in the center is subdivided into 5 x 5 group squares with edges of each 0.2 mm length and areas of 0.04 mm². These group squares are again subdivided into sixteen small squares of an area of each 0.05 mm x 0.05 mm = 0.0025 mm².

The lines limiting the large squares and the group squares are threefold with the central line as the actual dimension lines. The inner and outer auxiliary lines facilitate counting. They assist determining whether cells near or on the border lines are to be counted as within the area or omitted as outside of the counting area.

As the counting chamber comes with differently large squares it can be used for counting different types of cells. E.g. leucocytes are counted in the 4 large squares at the corners of the grid and normally for counting erythrocytes at least 5 group squares are used.

Neubauer-improved dark line

Dark line:
The grids of dark line counting chambers are engraved into the glass surface of the base of the chamber. When looking through a microscope these lines appear to be dark.
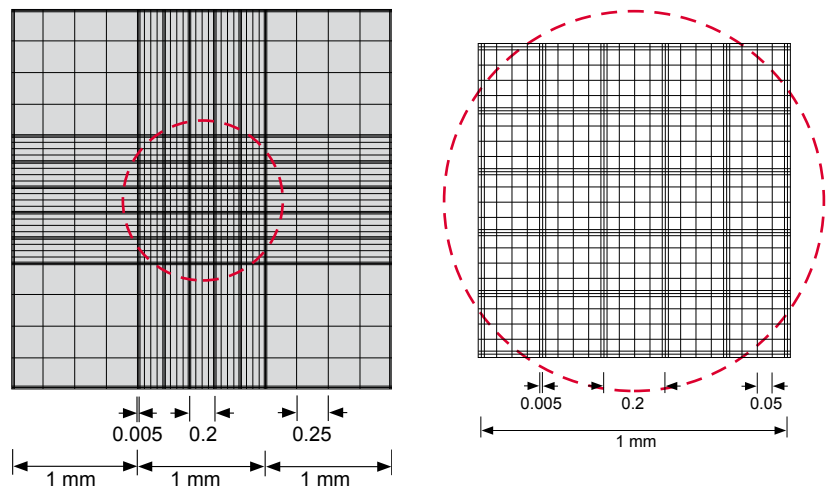
Depth = 0.1 mm	□	mm x mm / 1 □	mm² / 1 □	Vol. [µl]
Total net ruling	1	3 x 3	9	0.9
Large squares per grid	9	1 x 1	1	0.1
Group squares per large square	25	0.2 x 0.2	0.04	0.004
Small squares per group square	16	0.05 x 0.05	0.0025	0.00025

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## Neubauer-improved bright line
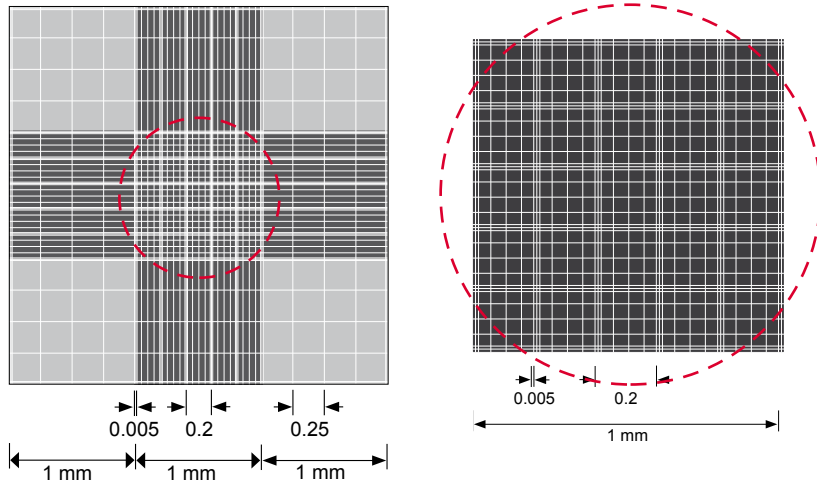
Bright line:
The grids of counting chambers with bright lines are engraved into a thin, vapour-deposited metal film. The bright lines contrast well with the darker, metallic background which facilitates the evaluation.

Depth = 0.1 mm	□	mm x mm / 1 □	mm² / 1 □	Vol. [µl]
Total net ruling	1	3 x 3	9	0.9
Large squares per grid	9	1 x 1	1	0.1
Group squares per large square	25	0.2 x 0.2	0.04	0.004
Small squares per group square	16	0.05 x 0.05	0.0025	0.00025

Neubauer
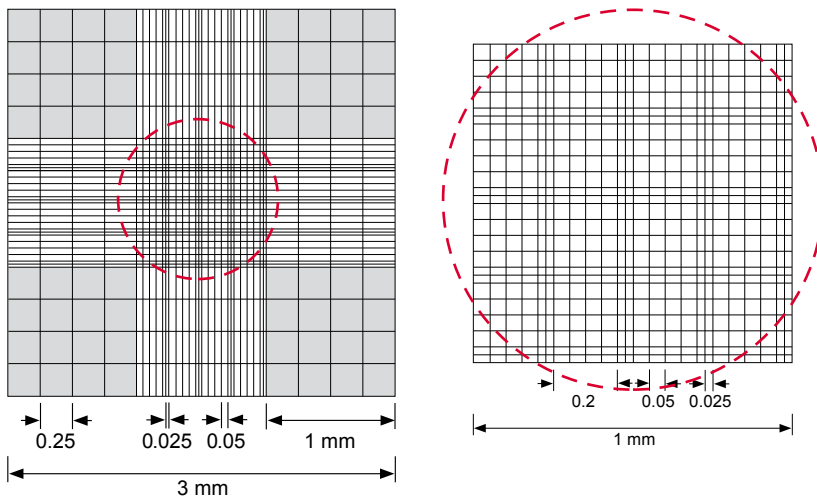
The depth of the Neubauer chamber is 0.1 mm.

Its net ruling covers 3 mm x 3 mm in total and consists of 9 large squares of 1 mm².

The central large square is subdivided in 4 x 4 group squares of 0.2 x 0.2 mm². Triple lines in a distance of 0.025 mm separate the group squares from each other. Each group square is subdivided in 16 small squares of 0.05 mm side length.

Depth = 0.1 mm	□	mm x mm / 1 □	mm² / 1 □	mm³ = µl
Total net ruling	1	3 x 3	9	0.9
Large squares per grid	9	1 x 1	1	0.1
Group squares per large square	16	0.2 x 0.2	0.04	0.004
Small squares per group square	16	0.05 x 0.05	0.0025	0.00025

Buerker

The depth of the Buerker counting chamber is 0.1 mm. Its counting grid covers 9 mm² and is subdivided by triple lines into 9 large squares. The distances between the middle lines are 1 mm.

Each of these large squares is subdivided into 16 small squares by double lines with a space of 0.05 mm between them. The inner lines of these small squares form areas of 0.2 x 0.2 mm². The crossings of the double lines form small squares of 0.05 x 0.05 mm². These squares are suitable for counting thrombocytes and erythrocytes.
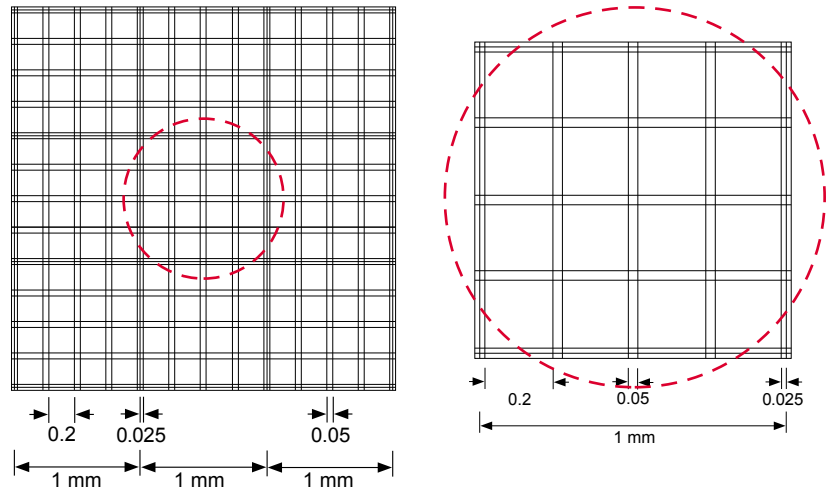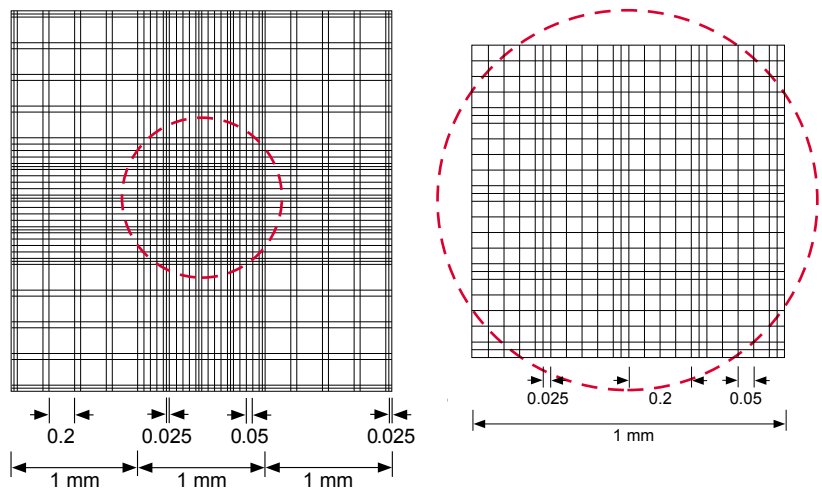
Depth = 0,1 mm	□	mm x mm / 1 □	mm² / 1 □	mm³ = µl
Total net ruling	1	3 x 3	9	0.9
Large squares per grid	9	1 x 1	1	0.1
Small squares per Large square	16	0.2 x 0.2	0.04	0.004

Buerker-Tuerk

The depth of the Buerker-Tuerk chamber is 0.1 mm. The counting grid covers 9 mm² and is subdivided by triple lines into 9 large squares.

Each of these large squares is subdivided into 16 small squares by double lines with a space of 0.05 mm between them. The inner lines of these small squares form areas of 0.2 x 0.2 mm².

Additionally to the Buerker chamber the 16 small square of the central large square are subdivided again into 16 squares with 0.05 mm length of the edge and an area of 0.0025 mm².

Depth = 0.1 mm	□	mm x mm / 1 □	mm² / 1 □	mm³ = µl
Total net ruling	1	3 x 3	9	0.9
Large squares per grid	9	1 x 1	1	0.1
Small squares per large square	16	0.2 x 0.2	0.04	0.004
Smallest squares per small square	16	0.05 x 0.05	0.0025	0.00025

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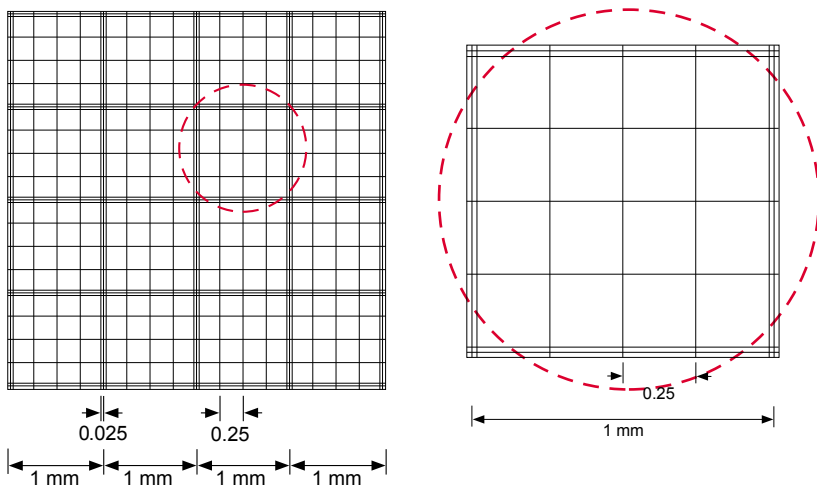
Fuchs-Rosenthal

The depth of the Fuchs-Rosenthal counting chamber is 0.2 mm. In total the grid covers 16 mm² and contains 16 large squares of each 1 mm length of the edge. These large squares are separated by triple lines with a space of 0.01 mm between each other. The distance between the center lines is 1 mm. All 16 large squares are subdivided into 16 small squares of a side length of 0.25 mm.

Due to the large counting grid and a depth of 0.2 mm the total volume amounts to 3.2 µl. This counting chamber is, therefore, preferably used for counting cell suspensions with relatively few cells, e.g. cerebro-spinal fluid.

Depth = 0.1 mm	□	mm x mm / 1 □	mm² / 1 □	mm³ = µl
Total net ruling	1	4 x 4	16	3.2
Large squares per grid	16	1 x 1	1	0.2
Small squares per large square	16	0.25 x 0.25	0.0625	0.0125

Thoma new
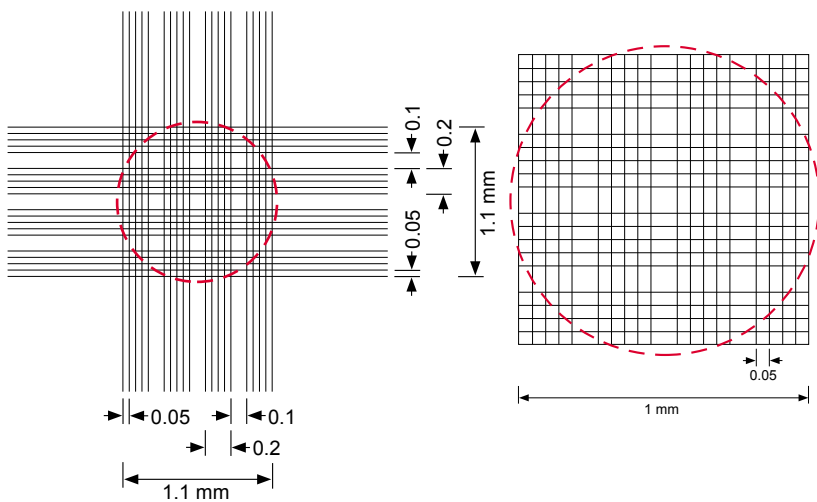
The depth of the Thoma new counting chamber is 0.1 mm. The grid covers an area of 1.1 x 1.1 mm². It is subdivided in 16 group squares with a side length of 0.2 mm.

These group squares have a distance of 0.1 mm to the adjacent group squares. They are subdivided into 16 small squares.

Thoma

The depth of the Thoma counting chamber is 0.1 mm The grid covers an area of 1 x 1 mm².

It is subdivided into group squares with a side length of 0.2 mm (like the Neubauer system).

The group squares are subdivided into 16 small squares of an area of 0.05 mm x 0.05 mm = 0.0025 mm².
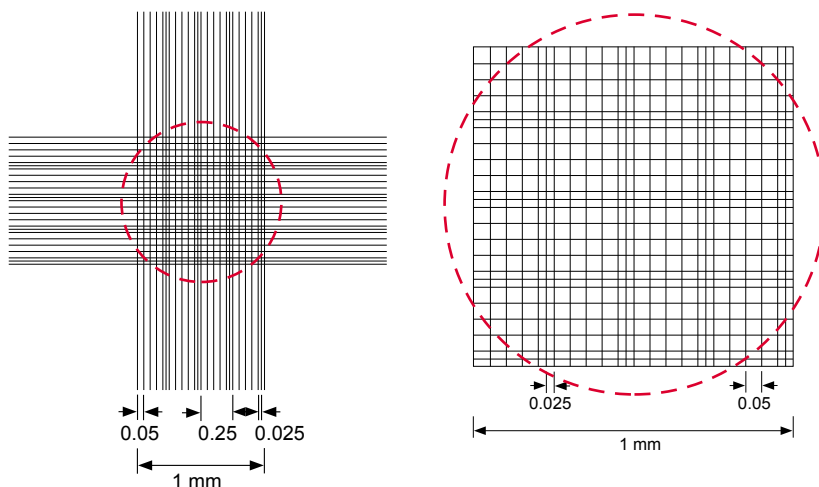
Nageotte

The depth of the Nageotte counting chamber is 0.5 mm.

The square area of 100 mm² is divided into 40 rectangles each with an area of 0.25 x 10 = 2.5 mm². This counting chamber is mainly used for counting cells in cerebro-spinal fluid or for counting nematodes.
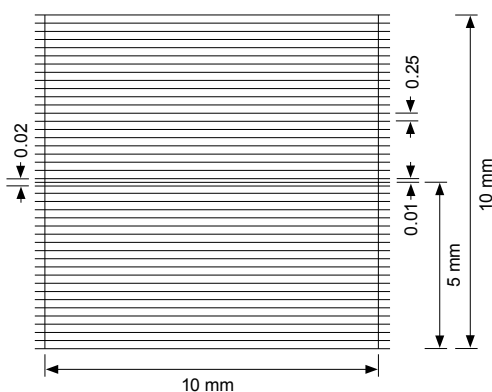
Malassez

The depth of the Malassez counting chamber is 0.2 mm The counting grid covers 2 x 2.5 mm². The large rectangles have an area of 0.25 x 0.20 = 0.05 mm². Each of them is subdivided into 20 small squares with an area of each 0.05 mm x 0.05 mm = 0.0025 mm².

This counting chamber is used for counting cells in liquor (cerebro-spinal fluid) and for counting nematodes for example.

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