Base Grid Guide

Trust us to focus on the supports, so **you can focus on the research**

quantifoil

Choosing a base grid

QUANTIFOIL® film supports are available on a wide range of grid materials, formats and meshes. Choosing the right combination is as simple as 1, 2, 3 with our guide.

1 Are you using single particle analysis or cryo-tomography in standard conditions?

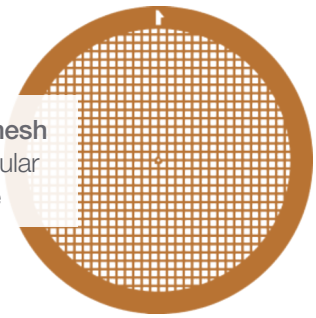
Browse our **standard square mesh grids** to find the right option for you.

Choice of two metals:

- Copper for screening and most samples
- Gold where a biocompatible metal is required for biological specimens

Three mesh sizes:

- Smaller 300 and 400 mesh for single particle analysis
- Larger 200 mesh for tomography



Copper 300 mesh
The most popular first choice

2 Do you need particular properties such as corrosion resistance or a large open area?

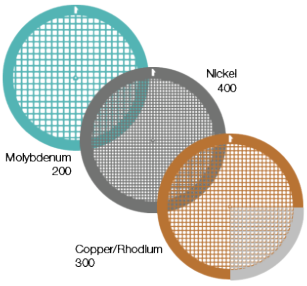
Take a look out our **alternative materials and meshes** section.

Choose from a range of additional metals:

- Non-oxidizing nickel for immunogold labelling
- Low-etch rate, High-quality molybdenum for ion-milling
- Copper/Rhodium to easily distinguish the grid sides

Alternative meshes to increase your viewing area:

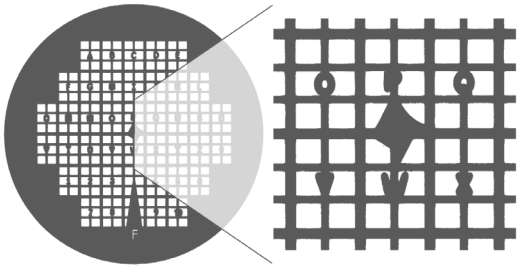
- Large 100 and 150 square mesh for tomography
- Rectangular mesh with increased open viewing area
- Hexagonal meshes with the largest open viewing area for a given mesh size



3 Are you looking for a finder grid for Correlative Light and Electron Microscopy or to re-locate samples on different instruments?

Take a look at our wide variety of **finder grids**, with options including:

- Markers in the grid squares, near features of interest, or at the rim edge
- A range of mesh sizes to match your experimental requirements
- Alpha-numeric marks for manual inspection, binary for automation, or a combination of both
- Large and small marker sizes



Standard Square Mesh Grids

Our most popular grid format is ideal for single particle analysis and tomography work.

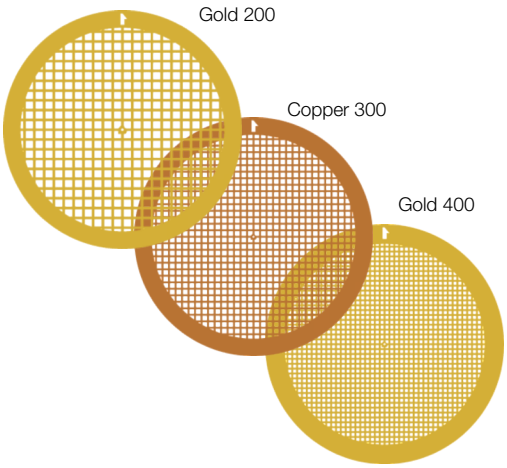
1 Using single particle analysis or cryo-tomography in standard conditions?

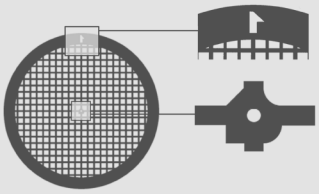
First, choose between copper or gold grids:

- Both are conductive, non-ionising and radiation-hard, so ideal for transmission electron microscopy
- Gold is preferred for many biological samples as it is chemically inert and bio-compatible

Then select 200, 300 or 400 mesh:

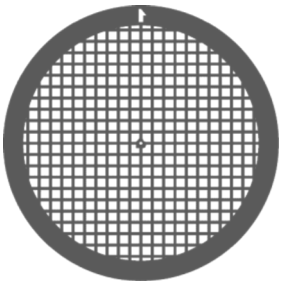
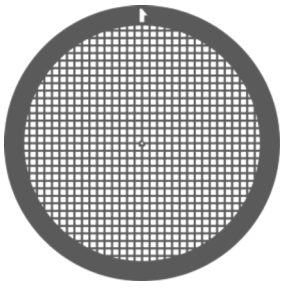
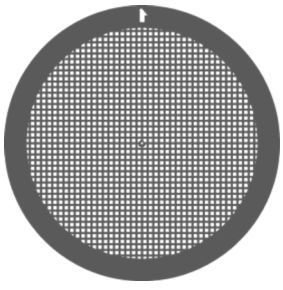
- All three sizes provide great sample support.
- For tomography applications, reduce the number of bars obstructing the beam by opting for 200 mesh
- Not sure about sizing? Check out the back cover to find out more!





Wondering about rim and centre marks?

Check out the back cover for an explanation!

Mesh Size	200	300	400
			
Materials	Copper, Gold	Copper, Gold	Copper, Gold
Pitch (µm)	125	83	62
Bar width (µm)	35	25	25
Hole width (µm)	90	58	37
Rim width (mm)	0.225	0.225	0.225
Centre mark	asymmetrical	asymmetrical	asymmetrical
Rim mark	asymmetrical	asymmetrical	asymmetrical

Want to maximize your open viewing area for tomography without sacrificing strength?

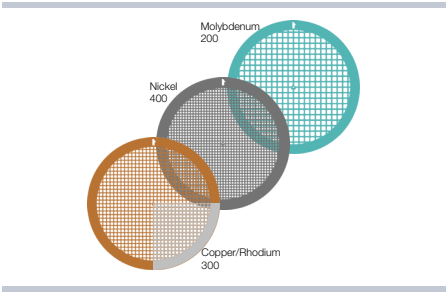
A rectangular mesh aligned with the tilt axis minimizes the number of grid bars in your images, while maintaining good sample support.

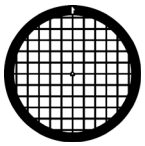
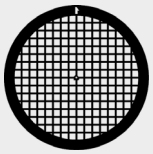
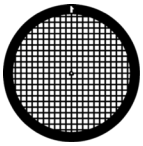
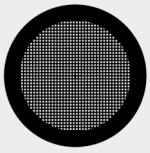
2 **Do you need particular properties such as corrosion resistance or a large open area?**

Alternative Square Meshes and Metals

Select a grid with the properties you need from our wide range of metals and materials.

- Non-oxidising nickel for immunogold labelling
- Low-etch rate, high quality **molybdenum** for FIB milling and high temperatures
- **Copper**/**Rhodium** to distinguish more easily between the shiny and dull side of the grid
- 100 and 150 mesh for a larger open viewing area, for applications such as tomography

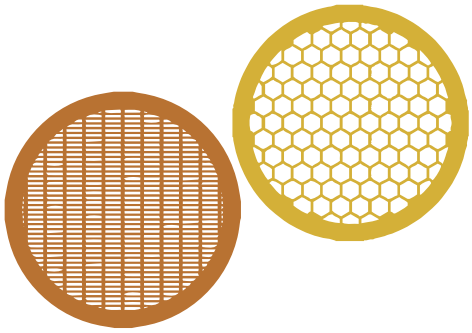


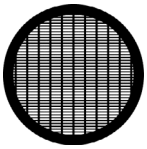
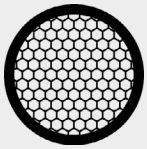
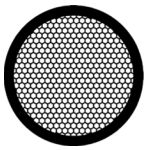
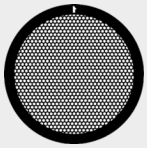
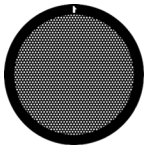
Mesh size	Materials	Pitch (µm)	Bar width (µm)	Hole width (µm)	Rim width (mm)	Centre mark	Rim mark
100 	Copper Gold	250	45	205	0.225	asym.	yes
150 	Copper Gold	165	40	125	0.225	asym.	yes
200 	High-quality molybdenum	125	35	90	0.225	asym.	yes
200 	Copper/ Rhodium Nickel	127	26	101	0.225	asym.	no
300 	Copper/ Rhodium Nickel	85	25	60	0.225	asym.	no
400 	Copper/ Rhodium Nickel	64	23	41	0.225	asym.	no

Alternative Mesh Arrangements

Maximize your open viewing area while maintaining strong sample support.

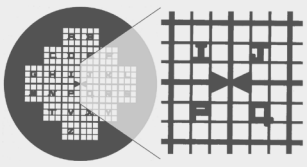
- Benefit from larger open viewing areas with our rectangular and hexagonal meshes if the bars in square meshes are an issue
- Hexagonal meshes:
  - Maximize open viewing area for a given mesh size
  - Offer increased support strength compared to square mesh of equivalent periodicity
  - Minimize the grid bars in your tomography images while maintaining sample support with a rectangular grid aligned to the tilt axis



Mesh size	Materials	Pitch (µm)	Bar width (µm)	Hole width (µm)	Rim width (mm)	Centre mark	Rim mark
Rectangular 100 x 400 	Copper Gold	250/62	45/25	205/37	0.225	no	no
Hexagonal 100 	Copper Gold	250	35	215	0.225	no	no
Hexagonal 200 	Copper Gold	125	25	100	0.225	no	no
Hexagonal 300 	Copper Gold	83	25	58	0.225	no	yes
Hexagonal 400 	Copper Gold	62	25	37	0.225	no	yes

Need to identify the same place on the grid on different microscopes?

Take a look at our finder grid selection on page 6



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3 **Are you looking for a finder grid for Correlative Light and Electron Microscopy or to re-locate samples on different instruments?**

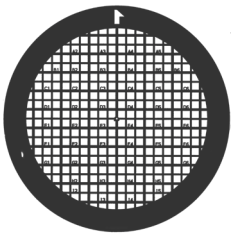
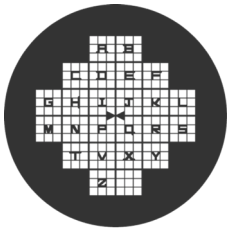
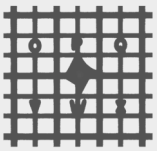
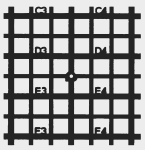
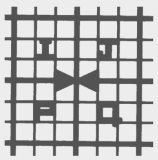
Popular Finder Grid Formats

Quickly return to the same spot on the grid on any instrument.

Finder grids have reference patterns and numbering systems to aid re-location of a specific feature on another microscope (either electron or light). They are most often used in correlative light and electron microscopy (CLEM) and sample analysis such as AHERA analysis for asbestos.

There are many designs, but the three shown on this page offer the benefits most researchers are looking for and are the most popular for use with Quantifoil® holey carbon supports.

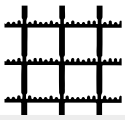
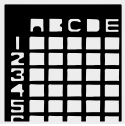
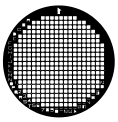
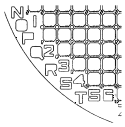
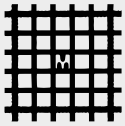
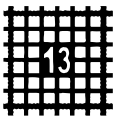
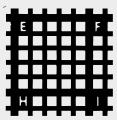
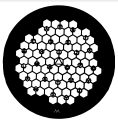
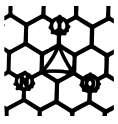
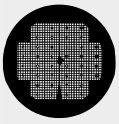
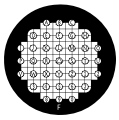
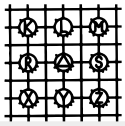
- Easy to navigate during grid scanning, with identification symbols close to areas of interest in the grid mesh
- Minimize beam obstruction with wide 200 mesh
- Minimize grid regions lost to numbering by sharing identification symbols between squares or including them within grid bars
- Easy to distinguish grid orientation with asymmetric grid square, rim and/or centre marks
- Simple-to-read alphanumeric labelling systems

	Grid Format		
			
	London H2 200 mesh	**G200 F1 200 mesh**	**G200 F2 200 mesh**
Grid labelling zoom			
Grid labelling description	40 blocks of 6 cells. Each are identified by letters A-Z and numbers 0-9 and delineated by thicker grid bars. The 6 cells of each block are arranged in a 3 by 2 pattern. The identification marks are built into the middle bar of each block.	An alpha-numerical code identifies 48 blocks of 6 cells each (3 x 2 pattern), delineated by thicker grid bars. Each block's code is attached to the baseline of its centre-bottom cell, letters representing rows and numbers representing columns.	24 blocks of 3 x 3 cells, delineated by thicker grid bars, are identified by a letter built into the centre cell of each block.
Materials	Copper, Gold	Copper, Gold	Copper, Gold
Pitch (µm)	127	83	62
Bar width (µm)	15	35-25	25-12
Hole width (µm)	112	90-100	106
Rim width (mm)	n/a	0.25	n/a
Centre mark	asymmetrical ("F")	asymmetrical	reverse arrow
Rim mark	yes	asymmetrical	no

Alternative Finder Grid Formats

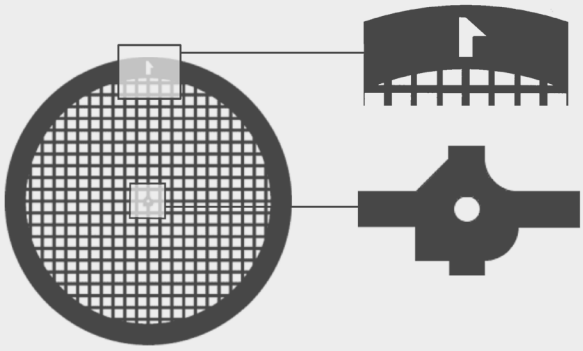
Uniquely identify each grid square in a way that suits your experiment. Choose the perfect label arrangement for your experiment:

- Need to avoid labels obscuring any part of the grid? Try a grid with labels on the rim: G200 F4 or G200 HF3
- For automated workflows, try our finder formats with machine-readable labels including the G100 F1 or G200 HF3
- Improve sample support with high mesh finder grids such as G300 F1 or G400 F1
- Increase the open viewing area with a very wide mesh (London HF15) or hexagonal mesh (London H6)

Grid	Mesh and materials	Grid label zoom	Grid label description	Pitch (µm)	Bar and hole width (µm)	Rim width (mm)	Rim and centre mark
	**G100 F1** 100 mesh copper, gold		Sixty grid squares each identified using a base two binary numbering system on the bottom grid bars of the horizontal axis. Short pillars represent 0 and long ones, 1.	250	40 and 210	n/a	asym. rim mark only
	**G200 F4** 200 mesh copper, gold		A 15 x 15 grid of cells, indexed with letters (columns) and numbers (rows). Each cell is asymmetrical (like the rim/centre marks on some grids) allowing grid orientation to be determined at microscopic levels.	125/105	20/15 and 105/90	0.225	asym. rim mark only
	**G200 HF3** 200 mesh copper, gold		15 x 15 grid of cells indexed with letters (columns) and numbers (rows). Each cell is asymmetrical (like the rim/centre marks on some grids) allowing grid orientation to be determined at microscopic levels.	125	10/20 and 115/105	n/a	asym. rim mark only
	**G300 F1** 300 mesh copper, gold		25 x 25 grid of cells divided into 5 x 5 cell blocks bounded by thicker crenellated bars. Each block of 25 cells has a central letter from A to Y for identification purposes.	83	20 and 63	n/a	asym. rim mark only
	**G400 F1** 400 mesh copper, gold		The grid is divided into blocks of 6 x 6 cell bounded by thicker crenellated bars. Each block of 36 cells has a central number from 1 to 32 for identification purposes.	83	15 and 47	n/a	asym. rim mark only
	**Embra** 200 mesh copper		Nine blocks each of 24 cells, bounded by thicker grid bars are identified by a letter in the upper left cell of each block. The 24 cells are arranged in a 5 x 5 pattern.	127	n/a	n/a	one straight and one cut out rim mark
	**London H6** 100 mesh copper, gold, nickel		Eighty one hexagonal cells are identified by a letter A-Z at every 3 cell junction, together with 1, 2 or 3 bars pointing into each of the 3 cells at the junction.	230/262	23 and 205 x 237	n/a	sym. centre and rim marks
	**London H7** 400 mesh copper, gold, nickel		Forty blocks of 20 to 24 cells in a 4 x 6 pattern, bounded by thicker grid bars, identified a letter A-Z or number 1-14, built into the middle bars of each block.	63	12 and 51	n/a	asym. centre mark only
	**London HF15** 135 mesh copper, gold, nickel		124 cells are identified by a letter A-Z or a number 0-9 at junctions of 4 cells with 1,2,3 or 4 bars pointing into each of the 4 cells at the junction.	188	20 and 168	n/a	asym. rim mark ("F"), sym. centre mark
	**HZB2** copper, gold	n/a	124 cells are identified by a letter A-Z or a number 0-9.	n/a	n/a	n/a	n/a

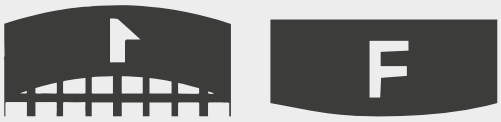
Rim and Centre Marks

Rim or centre marks are often included on grids to help you easily determine the grid orientation and which quandrant of the grid you are currently viewing.



Rim marks

Accurately orient your grid using location of the rim mark. They are often asymmetric, so that you can also tell which side of the grid you are looking at. The most common rim marks are a backwards “1” or an “F”:



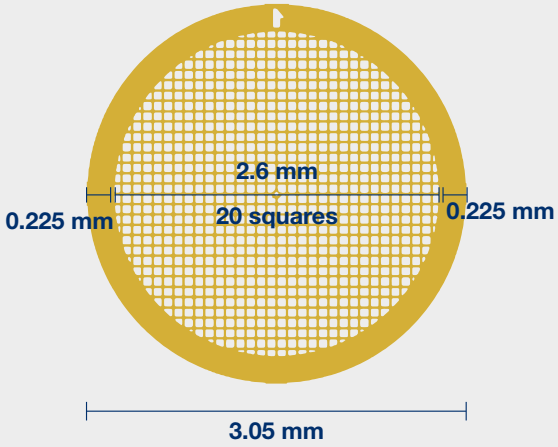
Centre marks

Our square mesh and some finder grids have an asymmetric centre mark. They allow you to locate which quadrant of the grid you are looking at when screening grids:

The central hole in the illustrations is a manufacturing artifact and may not appear on your grids. It does not affect the performance of the grid in any way.

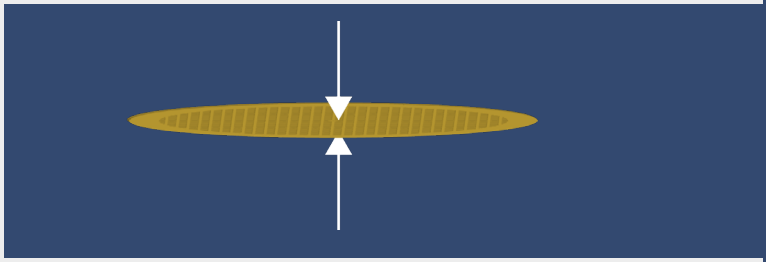
Understanding mesh sizes

Ever wondered what “200 mesh” actually means?



The mesh size for a grid is simply the number squares in one inch. Thus 200 mesh (with 200 squares in one inch) has a larger open viewing area than 300 mesh (with 300 squares in one inch). Electron microscopy grids are traditionally 3.05 mm in diameter, with a 0.225 mm rim, leaving a 2.6 mm (or 1/10 inch) diameter circle of mesh, which means that 200 mesh grids have 20 squares in each direction, 300 mesh have 30 squares and so on.

Grid thickness



The thickness of the grid is not constant, but depends on the mesh size. The wider the mesh (lower mesh number), the thicker the grid will be. Thus 100 mesh grids are thicker than 300 mesh grids.

Tolerances

Base grids are not manufactured by Quantifoil Micro Tools GmbH and we do not accept responsibility for the accuracy of the specifications provided by our suppliers.

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