Your Power for Health

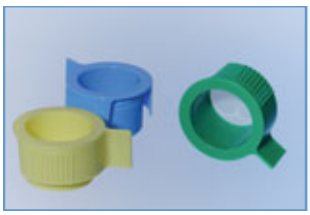
greiner bio-one

Catalogue BioScience

04/2015 Edition

www.gbo.com/bioscience

Product Highlights



EASYstrainer™ Cell Strainers

- Fast and safe filtration of cell suspensions
- Fits all standard 50 ml tubes
- Available with filter mesh sizes of 40, 70 and 100 µm

→ p. 33

CELLview™ Slide – Microscopic Slide with Glass Bottom

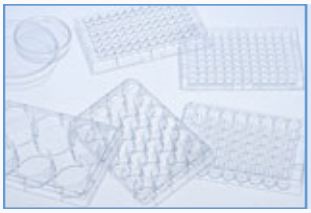
- For cell culture with subsequent cell stimulation and/or immunocytochemical and microscopic analysis
- Slide with detachable upper housing subdivided into 10 compartments
- Cover glass for optimum image quality

→ p. 53

SCREENSTAR Microplates for High Content Screening

- Black 96, 384 and 1536 well cycloolefin microplates with an ultra-clear film bottom
- Combination of glass-like optical properties with optimal surface for adherent cell culture
- Complete periphery access for high magnification objectives

→ p. 54-55



CELLSTAR® Cell Culture Vessels with Cell-Repellent Surface

- Effectively prevents cell attachment in suspension cultures of semi-adherent and adherent cell lines
- Spheroid culture of tumor cells, aggregation of stem cells, 3-D culture in hydrogels
- Different cell culture dishes and plates available

→ p. 50-51

Sapphire Pipette & Filter Tips – Visual Identification System

- Improved laboratory work due to easier identification of the tip size
- Transparent boxes with coloured tip inserts based on the tip volume
- Transparent (10/20 µl), yellow (100/200 µl), green (300 µl) and blue (1250 µl) tip inserts available

→ p. 154-157

Cryo.s™ Biobanking Tubes

- Space-efficient storage of biological samples in large-scale biorepositories
- Available in 300, 600 and 1000 µl size with laser-written Datamatrix code
- Medical-grade polymer with highest purity
- Automation-friendly 96-way rack

→ p. 199-201

Greiner Bio-One – Your Power for Health

Over seven billion people inhabit the earth today. As diverse as they all may be, one desire unites everybody: **The desire for a healthy, vital life.**

We know that we can make a significant contribution to the areas of health and safety in medicine. At the same time, this knowledge means **a great responsibility**, which we face up to with a high level of personal commitment and innovative solutions.

Products from Greiner Bio-One are applied worldwide from pure research to drug discovery to preanalytics or diagnostics. Thus we can offer scientists in many countries suitable platforms for their research work, laboratories the equipment for precise analysis and health professionals a basis for reliable diagnosis and therapy.

Offering an unsurpassed scope of products and services across a variety of disciplines, we focus on the evolving needs of our customers in the development of innovative products, to refine existing technologies, and redefine the state of the art.

Our fast and flexible response in customer-specific projects, combined with multiple strategic manufacturing sites, ensures an uninterrupted supply of critical components to meet your product needs.

With **worldwide locations** and effective **global distribution**, you will always be within reach of the product, service and support you need.

Greiner Bio-One has many international production sites and distribution centres:

Germany • Austria • Belgium • Brazil • China
France • Hungary • India • Japan • Netherlands
Thailand • United Kingdom • USA

More than 1700 employees throughout the world are dedicated to the aim of **constantly improving the life quality of all people.**

We put the **Power** in Health Protection.

Quality

Quality Management

Quality Standard in Compliance with DIN EN ISO 9001 and EN ISO 13485

Greiner Bio-One has been certified according to DIN EN ISO 9001 since 1994 through the continuing high standard of our production processes, quality controls and organisation (certificate → p. 222). Since 2004 we have additionally been certified according to EN ISO 13485 to fulfil the high international requirements for manufacturers of Medical Devices (certificate → p. 222). A total quality approach encompassing the latest production technologies, strict control of conditions and materials, as well as the qualification and development of personnel ensure constant improvement in both our products and processes. Our customers' trust in us for over 50 years certifies our high quality and our dedication to further quality improvement.

CE Marking

Products which fall within the scope of the European Directives 93/42/EEC for Medical Devices or 98/79/EC for In-Vitro Diagnostic Devices have to be labelled by a CE mark or a CE-IVD mark, respectively, in order to comply with the general requirements and safety regulations. According to this, some of our products have been considered as Medical or In-Vitro Diagnostic Devices. In our catalogue these products are labelled with a CE or a CE-IVD mark.

CE IVD

Quality Assurance and Quality Control

Good quality is an important criterion in the manufacturing of our products. For this purpose, our quality control system monitors the physical, chemical and biological functionality of our products. Quality control starts with the incoming raw material, is continued in production processes and ends with the dispatch of the finished product. Strict controls, conducted according to the legal provisions and specific standards, accompany the product. Continuous quality training ensures that our employees are informed about the applications of our products and the quality requirements placed on them.

Each product is retraceable to the production period, machine operators and tools, all the way back to the raw materials used.

A quality certificate for most products can be downloaded from our website www.gbo.com.

Quality Control System

Control of incoming goods
Incoming goods used for production (e.g. raw materials, foils, etc.) are checked for purity, identity and if they are in accordance with the agreed specifications.

In-process control (IPC)
During the manufacturing process, the quality of the products is checked periodically based on individual testing plans according to the specifications.

Quality control in the laboratory
Specific products are tested for physical, chemical and biological functionality (see below).

Final control
In addition to dimensional, visual and functional criteria, products are finally tested for labelling, packaging and documentation.

Products from Greiner Bio-One provide one or more of the following application-dependent features:

Free of detectable DNase, RNase and human DNA

Free of detectable DNase, RNase, human DNA

For reliable and accurate results in molecular biology applications, e.g. sequencing and amplification, the applied products are free of detectable DNase, RNase and human DNA. Therefore protective gear, like overalls, gloves and hairnets, is a prerequisite in all production areas. Furthermore, a routine monitoring of DNase, RNase and human DNA is performed. Products are washed with an appropriate volume of a 0.5 % Tween 20 solution to detach adherent nucleases and nucleotides. DNase, RNase and human DNA present in the washing solution are detected by Real Time PCR. The detection limits*) related to the applied PCR methods are **1.3 × 10^{-8} Kunitz units for DNase, 5 × 10^{-11} Kunitz units for RNase and 5 pg for human DNA.** All products that meet the above mentioned features are identified in our catalogue with the respective label.

Free of detectable endotoxins

non-pyrogenic

Endotoxins are complex lipopolysaccharides and part of the outer membrane of gram-negative bacteria. These substances are the most widespread and effective species of a group of so-called pyrogens that can cause fever. The US Pharmacopoeia guidelines stipulate that eluates from Medical Devices (e.g. washing fluids from disposables) do not exceed endotoxin levels of more than 0.5 EU/ml. For consumables that are in contact with cerebrospinal fluid, the endotoxin level should be at a minimum value of 0.06 EU/ml.

The testing of endotoxins is conducted in a **kinetic turbidimetric LAL assay** (Limulus Amoebocyte Lysate) with a **detection limit of 0.03 EU/ml***). This test procedure complies with the United States Pharmacopoeia (USP) Chapter <85> Bacterial Endotoxins Test. All products that meet the above mentioned feature are identified in our catalogue with the respective label.

Sterility

The validation of our products is conducted in accordance with ISO 11137. Related to this standard, the bioburden (germ level) is established for each product and periodically repeated.

Based on this data the necessary sterilisation process is conducted. Products labelled as sterile are routinely monitored. In-Vitro Diagnostic and Medical Devices appear with an **SAL (Sterility Assurance Level) of 10^{-6}**, other sterile products meet an **SAL of 10^{-3}**.

Binding properties of immunological products

The binding properties of all our immunological products are tested based on **ELISA**. The limits of the coefficient of variation (CV) of our products are as follows:

MICROLON® **CV < 5 %**; FLUOTRAC™ and LUMITRAC™ **CV < 10 %**. We provide these products with a shelf life of 4 years for the binding characteristics.

Cell compatibility of cell culture products

The quality of cell culture products is validated with different cell lines. Relevant parameters like morphology, cell growth and cell vitality are monitored.

More detailed information about the shelf life of our cell culture products is listed in the product data sheets on our website.

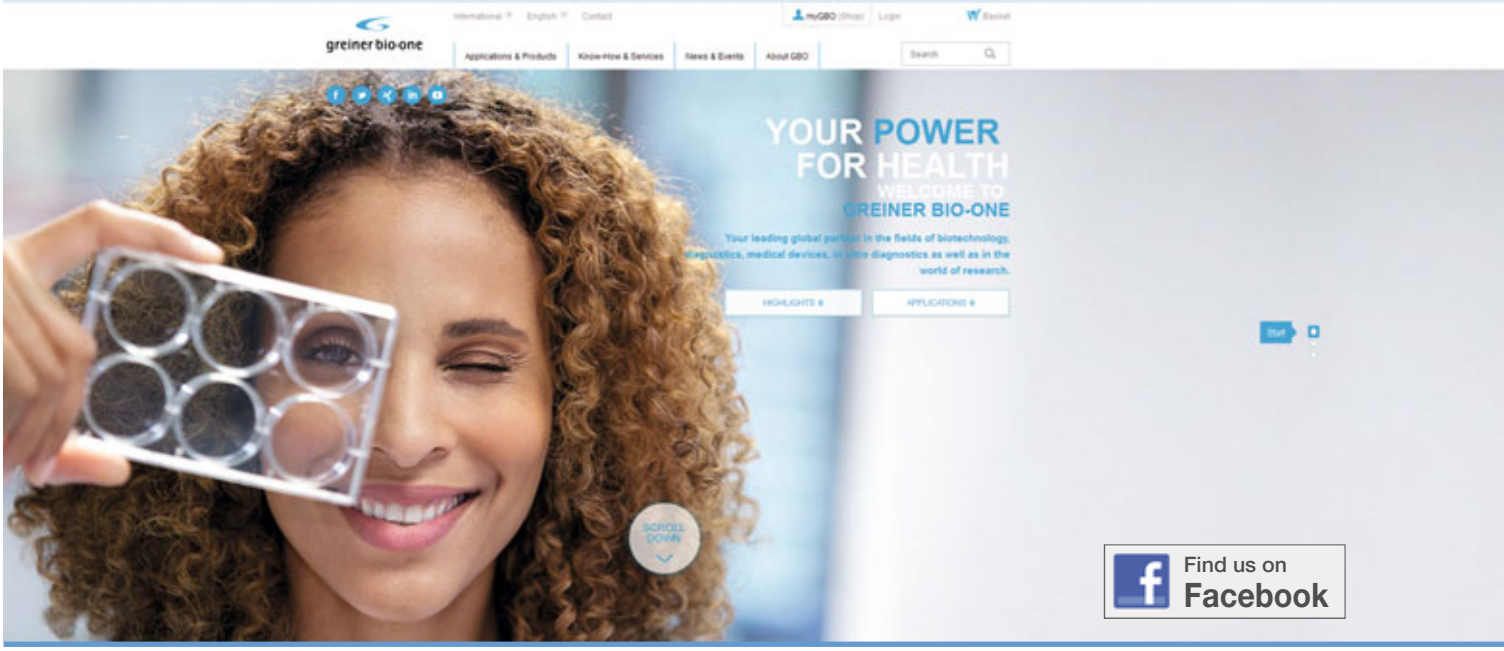
Free of cytotoxic substances

non-cytotoxic

Cell culture products used in cell-based applications and for In-Vitro Diagnostic Devices should not contain any cytotoxic substances. Therefore all relevant cell culture end products are analysed for cytotoxicity.

The detection of cytotoxicity is evaluated with mammalian cells according to **EN ISO 10993-5.**
All products that meet the above mentioned feature are identified in our catalogue with the respective label.

*) More information can be found on our website www.gbo.com. Errors and omissions excepted.



Greiner Bio-One Online

Fresh Design & More Services

The Greiner Bio-One website has received a complete makeover with a new, more intuitive layout and some great, new customer-orientated features.

Discover the possibilities of our website! We would like to share the passion we have for our new home on the world wide web. Here's an overview about the novel features contained within the site as well as popular existing ones.

Online Product Catalogue

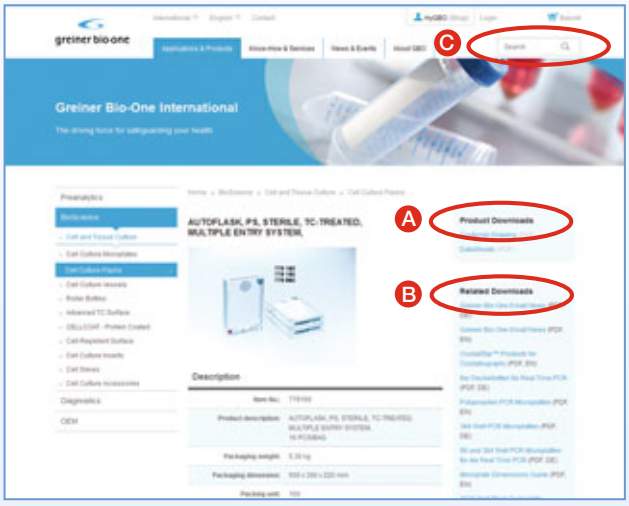
Your product information database

Acting in the spirit of ONE Bio-One, you are now able to access the complete product portfolio of Greiner Bio-One – Preanalytics, BioScience, OEM and Diagnostics.

Ⓐ Next to your product of interest, you will find additional information, such as technical data sheets and customer drawings **(Product Downloads).**

Ⓑ The section **Related Downloads** contains product-related information such as brochures and flyers.

Ⓒ If you know the catalogue number, you can enter this directly in the search function.



Download Center

Your gateway to a wealth of information

The Download-Center has been developed to house our complete library of information about Greiner Bio-One products and to make it easier to find and access this information. The download area contains instructions for use, product brochures, product data sheets, surveys and much more. If you are looking for a specific document, then the search function offers you various ways to search for it. You can search by product number, product category or by different language versions of documents.

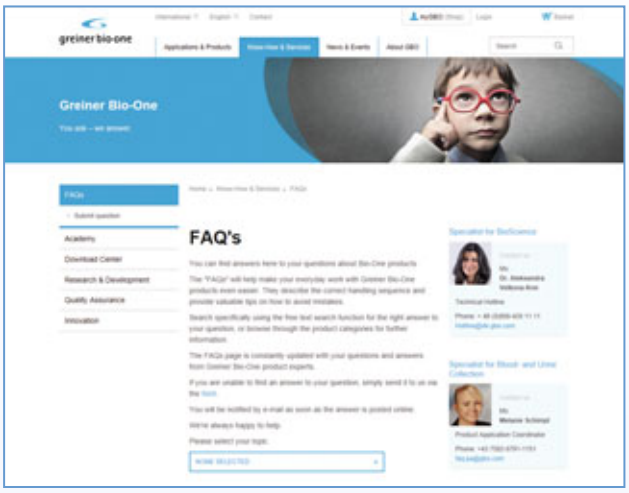
Frequently Asked Questions (FAQs)

You Ask – We Answer

Our FAQ section offers you the ability to send your question about Greiner Bio-One products and services straight to us. Our product specialists will be happy to assist you with your query and to make your daily work with Greiner Bio-One products even easier.

Search for already existing FAQs using the free text search function or browse through the product categories for further information.

The FAQs section is constantly updated with your questions and answers from Greiner Bio-One product experts.



E-Mail Newsletter

Stay up-to-date

Our e-mail newsletter is one of our most popular methods of keeping our customers informed. Subscribe today and stay updated with news around Greiner Bio-One. The newsletter will be sent out 2 to 3 times a year.

Our Newsletter keeps you updated about the latest product developments, new services, publications and much more. Additionally we send out invitations for Greiner Bio-One webinars, fairs and congresses.

Service@Greiner Bio-One

Online-Shop: www.gbo.com
Even outside business hours, our website can offer you a wide range of options - not just our online shop but also an extensive download area with plenty of current information.

EDI - Greiner Bio-One can provide you with a number of possibilities for limiting your administrative effort and therefore save you yet more time when processing orders. Contact our EDI team: **edi@de.gbo.com.**

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4 Microbiology / Bacteriology

5 Tubes / Beakers

6 Liquid Handling

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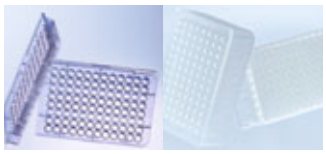

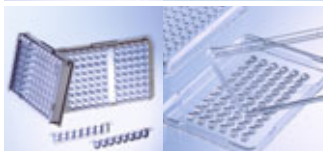

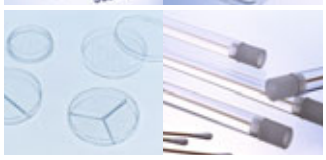

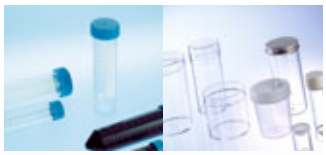

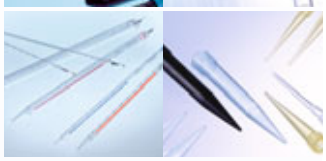

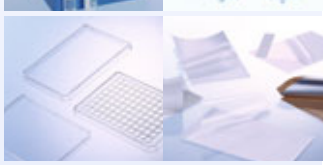

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Cell and Tissue Culture

1. Product Portfolio
For cell and tissue culture, Greiner Bio-One offers the following product lines:

- **CELLSTAR®**
  Cell culture vessels with physically modified surfaces for adherent or suspension cell cultures.

- **CELLMASTER™**
  Roller bottles made of polystyrene (with physical surface treatment) or polyethylene terephthalate.

- **Advanced TC™**
  Cell culture products with a novel polymer modification enhancing the adhesion and improving the cultivation of fastidious cells.

- **CELLCOAT®**
  Protein-coated culture vessels for adherent cell culture. Our CELLSTAR® product family is coated with the following proteins: Collagen Type I, Poly-D-Lysine, Poly-L-Lysine, Fibronectin and Laminin.

- **CELLview™ Cell Culture Products with Glass Bottom**
  CELLview™ combines the convenience of standard plastic cell culture products with the optical quality of glass, providing superior high-resolution microscopic images of in-vitro cultivated cultures.

- **CELLSTAR® CELLreactor™**
  Small bioreactor for the cultivation of suspension and spheroid cells facilitating miniaturisation of large-scale setups and maximising the number of parallel experiments. In addition to cell culture applications, the CELLreactor™ can be applied for the expansion of aerobic bacteria, yeast or other microorganisms in shaken cultures as well as for storage of components and liquids requiring gas exchange.

- **EASYstrainer™ Cell Strainers**
  Cell sieves for the fast and safe filtration of cell suspensions such as those from tissue dissociation or for flow cytometry. The innovative design allows for secure, aseptic handling with a clearly reduced risk of contaminating the filtered cell suspension.

- **ThinCert™ Cell Culture Inserts**
  Membrane supports for multiwell plates, consisting of polystyrene housings and sealed PET capillary pore membranes.
  With the ThinCert™Plate, Greiner Bio-One offers an innovative solution for the air-lift culture with ThinCert™ cell culture inserts. Its deep wells allow a larger volume of medium to be available to the air-lift culture.

2. Material
Exclusively high-grade polystyrene and polyethylene terephthalate are used as raw materials for manufacturing our cell culture products.

Polystyrene (PS) is characterised by its high clarity, which greatly simplifies the optical control of cell growth in polystyrene flasks, tubes and roller bottles.

Polyethylene terephthalate (PET) is used for manufacturing roller bottles, media bottles and membranes, due to its beneficial chemical, optical and mechanical properties.

3. Surface Treatment

The surfaces of CELLSTAR® and CELLMASTER™ products for adherent cell culture are treated using a special physical method. This treatment leads to polar groups, such as carboxy and hydroxy groups, being incorporated into the plastic surface, making it hydrophilic. This significantly improves the adhesion of cells and the binding of proteins to the plastic surface. Cell culture treated products are labelled with **TC surface treatment** (TC = Tissue Culture) in the catalogue.

For the cultivation of fastidious cells or cells cultivated under restricted growth conditions Greiner Bio-One offers the **Advanced TC™** polymer modification. Based on this innovative technique, the cell culture surface is modified in such a way as to positively influence cellular features and functions. Enhanced cell attachment and higher proliferation rates improve and accelerate cell expansion.

In addition to the physically and chemically modified surfaces for cell culture, we also provide products coated with Collagen Type I, Poly-D-Lysine, Poly-L-Lysine, Fibronectin and Laminin. These coatings facilitate the growth of many cell types, including hepatocytes, muscle cells, epithelial/endothelial cells, neural cells and transfected cell lines. The products are summarised in our **CELLCOAT®** product range.

Our **suspension cell culture vessels** with their strongly hydrophobic surfaces are particularly well suited for non-adherent cell cultures, hybridomas and embryonic stem cell cultures.

CELLSTAR® cell culture vessels with a cell-repellent surface reliably prevent cell attachment in suspension cultures of semi-adherent and adherent cell lines where standard hydrophobic surfaces generally used for suspension culture are insufficient.

4. Screw Caps with a Hydrophobic Capillary Pore Membrane

Filter screw caps for cell culture / suspension culture flasks, roller bottles and the CELLreactor™ have a patented hydrophobic capillary pore membrane (Fig. 1). The defined and constant pore size of 0.2 µm is achieved with minimal variation by means of a specially developed, high-technology method (Fig. 2).

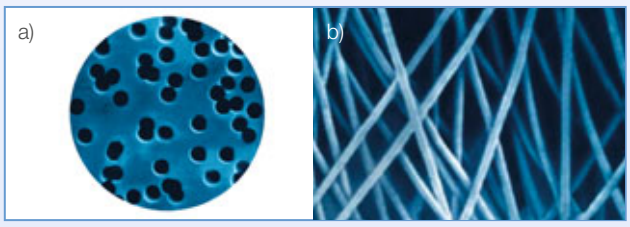


Figure 1: a) Top view of the capillary pore membrane (electron micrograph) b) Cross-section of the capillary pore membrane: the capillaries are filled with copper and the PET is then removed by etching (electron micrograph)

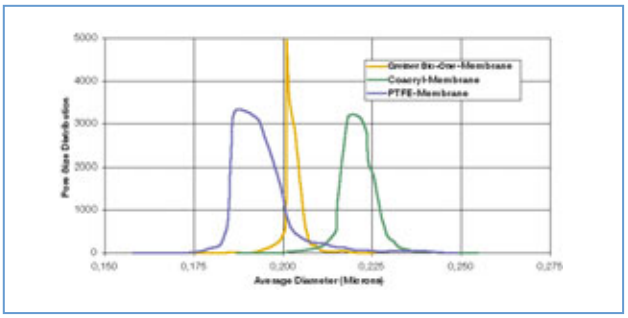


Figure 2: Comparison of different membrane types according to their pore size distribution

The filter insert provides both optimal protection against contamination and efficient gas exchange.
By using PET/PTFE which are responsible for the mechanical strength and hydrophobic properties of the membrane, these advantages are retained even if the inside of the cap is briefly wetted with medium.

5. Expiry Date / Lot Number

All cell culture products are labelled with expiry date and lot number in order to ensure transparency of product processes and retraceability of our products throughout the production process.

6. Quality Control

Based on automated production processes with quality controls, we provide immaculate, high-quality products for all areas of cell culture.

All CELLSTAR® and CELLMASTER™ products as well as ThinCert™, Advanced TC™ and CELLview™ are sterilised by irradiation. They are controlled for sterility as well as for absence of detectable endotoxins, DNase/RNase and human DNA (→ Quality p. 6-7).

Cytotoxicity

In many experiments toxic effects on cells or tissue cultures play an important role particularly in the field of In-Vitro Diagnostics. The absence of any adverse biological reaction due to contact with our production materials, e.g. polystyrene or polypropylene, is closely monitored by cultivating cells in the presence of extracts from these polymers.

The detection of cytotoxicity is evaluated with mammalian cells according to EN ISO 10993-5. All cell culture relevant end products are analysed for the absence of cytotoxic components. Therefore the end product is cultivated with cell culture media. The generated extract is then added to a sensitive cell culture for 24 hours.

!

Further information on cell culture products

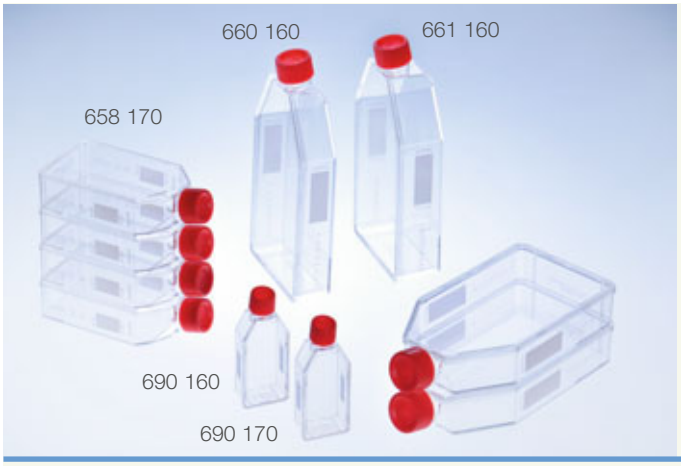
→ **Application Note "siRNA-dependent gene silencing on various cell culture surfaces"** (F071 105)
→ **Application Note "Improved cultivation / differentiation of embryonic stem cells"** (F073 117)
→ **Application Note "Cultivation and differentiation of hADSCs with CELLSTAR® and CELLCOAT® products"** (F073 113)

Cell Culture Products

CELLSTAR® Standard Cell Culture Flasks

For cell culture, Greiner Bio-One offers standard and filter cap cell culture flasks with growth areas of 25 cm², 75 cm² and 175 cm². Suspension culture flasks complete the range in the sizes of 50 ml, 250 ml, 550 ml and 650 ml. All Greiner Bio-One cell culture flasks are made of high-grade polystyrene. For adherent cell culture, the surfaces of our standard and filter cap cell culture flasks are physically surface-treated to improve cell adhesion and proliferation.

The special design of our cell culture flasks makes it possible to efficiently reach the cell lawn with a cell scraper, whilst still providing optimal access with a pipette. The special neck design reduces the risk of wetting the inside of the cap with medium, thus providing additional protection against contamination. The stacking rim on the top of the flasks ensures firm standing and easy stackability in the incubator. Both sides have a printed graduation for easier filling.



Standard Cell Culture Flasks

- Improved cell adhesion through physical surface treatment
- Cell culture flasks with standard screw cap (without filter)
- Canted neck
- Graduation on both sides
- Sterile and user-friendly packaging
- 25 cm², 75 cm² and 175 cm² growth areas
- High and flat design of the 175 cm² cell culture flask for variability of media volume

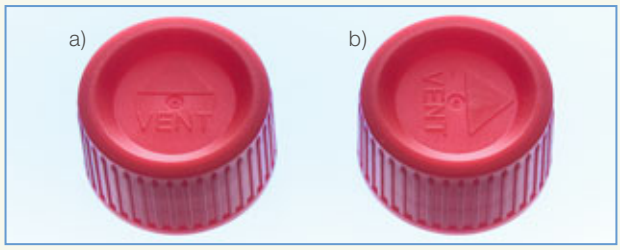


Figure 1: Standard screw cap with ventilation position
a) ventilation position b) gas-tight position

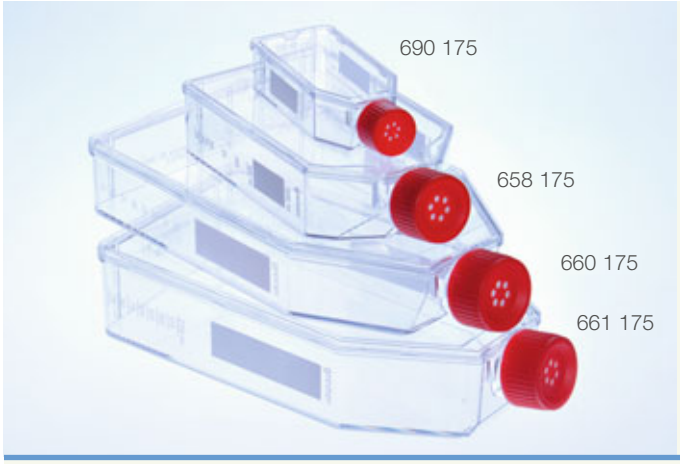
Standard Screw Cap with Ventilation Position
The secured click-in ventilation position is reached, once the cap snaps in audibly. In addition, the correct position is indicated by a vertical tip of a triangle and the readable writing VENT (Fig. 1). This allows visual verification of the aeration position, even when the flasks are stacked in the incubator. If the cap is turned clockwise to the end stop, the flask is closed gas-tight.

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Cat.-No.	690 160	690 170*)	658 170	660 160	661 160
Flask design	-	-	-	flat	high
Growth area [cm²]	25	25	75	175	175
Total volume [ml]	50	50	250	550	650
Working volume [ml]	5 – 10	5 – 10	15 – 38	20 – 45	20 – 85
TC surface treatment	+	+	+	+	+
Sterile	+	+	+	+	+
Standard screw cap	red	red	red	red	red
Quantity per bag/case	10/200	10/200	5/120	5/50	4/40

*) with measuring grid

CELLSTAR® Filter Cap Cell Culture Flasks



Filter Cap Cell Culture Flasks

- Improved cell adhesion through physical surface treatment
- Cell culture flasks with filter screw cap
- Canted neck
- Graduation on both sides
- Sterile and user-friendly packaging
- 25 cm², 75 cm² and 175 cm² growth areas
- High and flat design of the 175 cm² cell culture flasks for variability of media volume

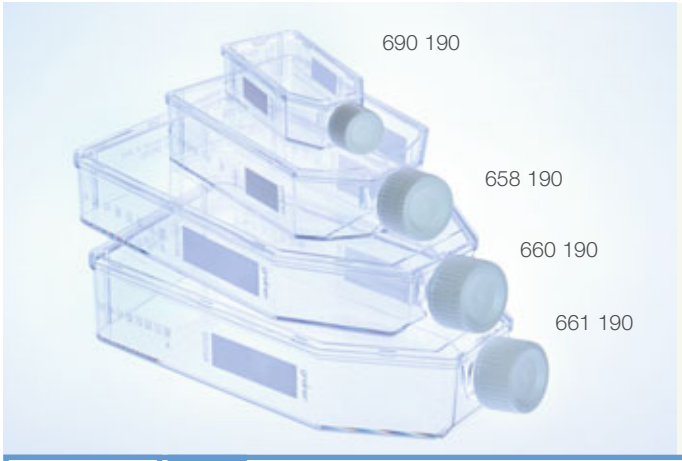
A specific capillary pore membrane is used for the filter screw caps of our filter cap cell culture flasks. The defined pore diameter of 0.2 µm provides a sterile barrier against contamination. The inner surface of the PET membrane is PTFE-coated generating a hydrophobic facing which prevents wetting of the filter material from internal liquid. Due to the high airflow rate of the filter material, an optimal gas exchange is ensured.

- High airflow rate and optimal gas exchange
- Additional standard screw caps (without filter) available on request

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Cat.-No.	690 175	658 175	660 175	661 175
Flask design	-	-	flat	high
Growth area [cm²]	25	75	175	175
Total volume [ml]	50	250	550	650
Working volume [ml]	5 – 10	15 – 38	20 – 45	20 – 85
TC surface treatment	+	+	+	+
Sterile	+	+	+	+
Filter screw cap	red	red	red	red
Quantity per bag/case	10/200	5/120	5/50	4/40

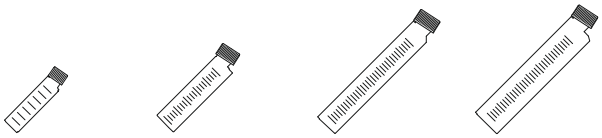
CELLSTAR® Suspension Culture Flasks



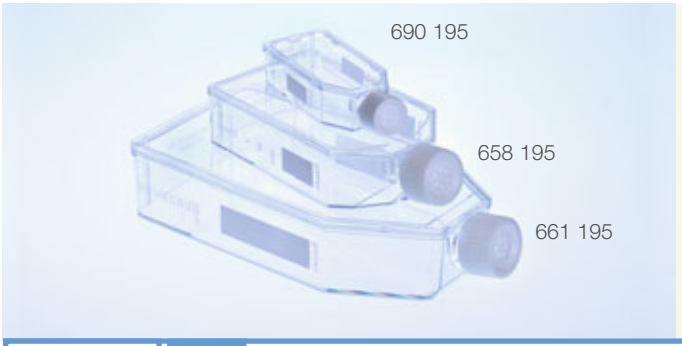
Standard Suspension Culture Flasks

- Hydrophobic surface, ideal for suspension cultures, hybridoma and embryonic stem cells
- Suspension culture flasks with standard screw cap (without filter)
- White standard screw caps with ventilation position (→ p. 16)
- Canted neck
- Graduation on both sides
- Sterile and user-friendly packaging
- 50 ml, 250 ml, 550 ml and 650 ml volumes available

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



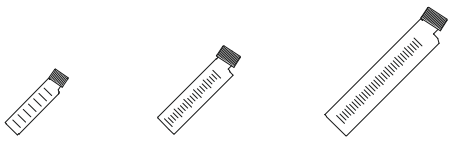
Cat.-No.	690 190	658 190	660 190	661 190
Flask design	-	-	flat	high
Volume [ml]	50	250	550	650
TC surface treatment	-/suspension	-/suspension	-/suspension	-/suspension
Sterile	+	+	+	+
Standard screw cap	white	white	white	white
Quantity per bag/case	10/200	5/120	5/50	4/40



Filter Cap Suspension Culture Flasks

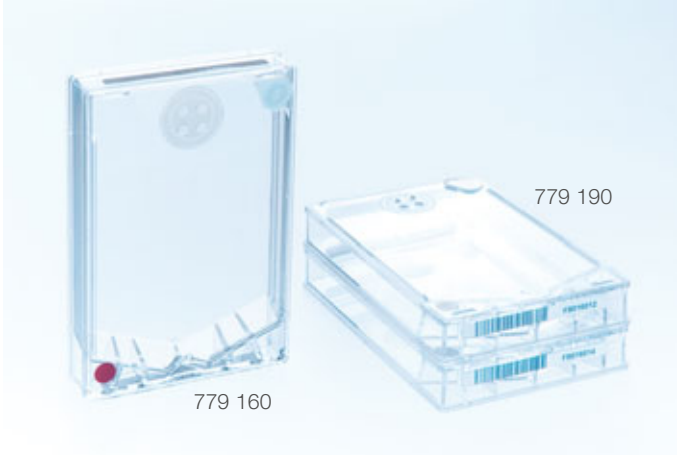
- Hydrophobic surface, ideal for suspension cultures, hybridoma and embryonic stem cells
- Suspension culture flasks with filter screw cap
- Graduation on both sides
- Sterile and user-friendly packaging
- Canted neck
- Additional standard screw caps (without filter) available on request

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	690 195	658 195	661 195
Flask design	-	-	high
Volume [ml]	50	250	650
TC surface treatment	-/suspension	-/suspension	-/suspension
Sterile	+	+	+
Filter screw cap	white	white	white
Quantity per bag/case	10/200	5/120	4/40

CELLSTAR® AutoFlask™



AutoFlask™

- Compatible with a wide range of cell culture and liquid handling systems
- Hydrophobic membrane for optimal gas exchange
- Format
  Length: 127.76 mm
  Width: 85.48 mm
  Height: 19.5 mm
- Pre-scored multiple entry septum
- Centrifugation pocket for cell separation
- Customisable barcode labelling
- Handling and pipetting in horizontal position
- Different coatings and surface modifications available

AutoFlask™ – Cell culture flask for automated systems
The standard microplate footprint of the AutoFlask™ ensures compatibility with a wide range of cell culture and liquid handling systems. A robotically accessible pre-scored multiple entry septum (Fig. 1 → 1) assures sterility of flask contents throughout processing.

The unique centrifugation pocket (Fig. 1 → 2) enables separation of cells from supernatant inside the flask and the integrated hydrophobic filter (Fig. 1 → 3) facilitates gas exchange during the cultivation of cells. A user-friendly colour coding (Fig. 1 → 4) allows easy identification of the AutoFlask™ version. Beside the cell culture treated and the suspension culture version, Greiner Bio-One also offers the AutoFlask™ with **Poly-D-Lysine** (→ p. 45) or **Collagen Type I** (→ p. 43) coating as well as with **Advanced TC™** polymer modification (→ p. 39).

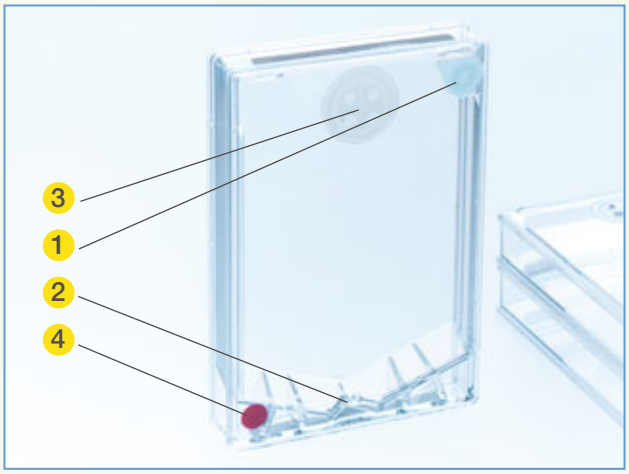
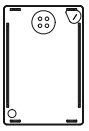
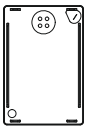


Figure 1: CELLSTAR® AutoFlask™

Further information on the AutoFlask™

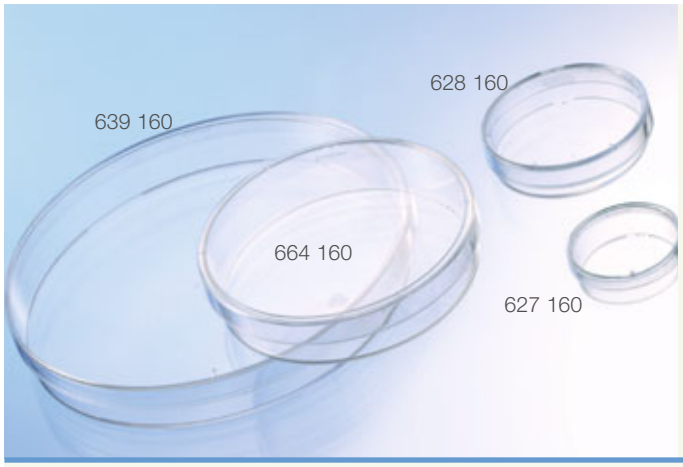
→ **"Comparative cell growth study using the AutoFlask™"** (F072 094)

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Cat.-No.	779 160	779 190
Description	AutoFlask™	AutoFlask™
TC surface treatment	+	-/suspension
Sterile	+	+
Growth area [cm²]	83.6	83.6
Total volume [ml]	110	110
Working volume [ml]	20 – 40	60 – 80
Colour code	red	white
Barcode labelling	+	+
Quantity per bag/case	10/100	10/100

CELLSTAR® Cell Culture Dishes



Cell Culture Dishes

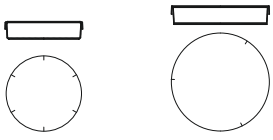
- Improved cell adhesion through physical surface treatment
- Vents ensure optimal gas exchange
- Sterile and user-friendly packaging
- Available in the nominal sizes 35, 60, 100 and 145 mm ø
- 8.7 to 143 cm² growth areas
- Easy stacking
- Maximal transparency for excellent microscopic analysis
- 35 ø dish also available with 4 internal wells

Like all Geiner Bio-One products, cell culture dishes are manufactured according to our high quality standards. Dishes are available in a wide variety of different dimensions and growth areas. In the case of 58 cm² and 143 cm² dishes, an extra high profile with a height of 20 mm is available.

! For exact dimensions of our cell culture dishes, please refer to the product data sheets on our website.

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Cat.-No.	627 160	627 170	628 160
Nominal size ø x height [mm]	35 x 10	35 x 10	60 x 15
Growth area [cm²]	8.7	0.93/well	21
Total volume [ml]	10	9	28
Working volume [ml]	5	0.08/well	6 – 7
Vents	+	+	+
TC surface treatment	+	+	+
Sterile	+	+	+
Quantity per bag/case	10/740	10/740	10/600



Cat.-No.	664 160	639 160
Nominal size ø x height [mm]	100 x 20	145 x 20
Growth area [cm²]	58	143
Total volume [ml]	100	240
Working volume [ml]	16 – 17	25 – 27
Vents	+	+
TC surface treatment	+	+
Sterile	+	+
Quantity per bag/case	15/360	5/120

CELLSTAR® OneWell Plate™ and FourWell Plate™

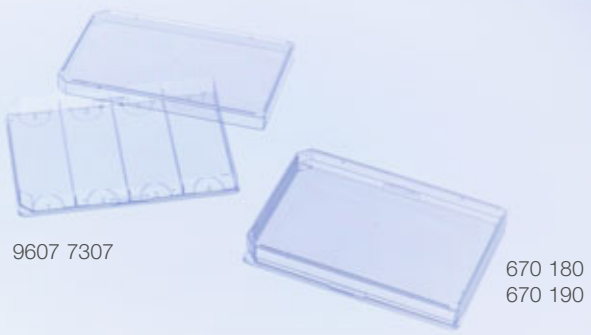
CELLSTAR® OneWell Plate™
Non-divided plate for tissue culture applications

The CELLSTAR® OneWell Plate™ can be used if large quantities of cells have to be cultivated. The external dimensions comply with ANSI standards to render the plate suitable for use on a wide range of cell culture and liquid handling systems. With a growth area of 95 cm^2, the OneWell Plate™ fills the gap between the growth areas of 58 cm^2 (Cat.-No. 664 160) and 143 cm^2 (Cat.-No. 639 160) in the cell culture dish product range. Handling and the required incubator space are improved compared to a round cell culture dish. Notches on the left side of the plate and the lid ensure a secured lid position.
The TC-treated version is provided with a proprietary physical surface treatment increasing the hydrophilicity of the plate and facilitating the cultivation of adherent cells. As with all Greiner Bio-One CELLSTAR® products, the CELLSTAR® OneWell Plate™ is made of high grade polystyrene and is guaranteed to be sterile, non-pyrogenic, non-cytotoxic and free of detectable DNase, RNase and human DNA.

Beside general tissue culture applications the CELLSTAR® OneWell Plate™ can be used as a multipurpose liquid container or disposable for the denaturation, hybridisation and washing of membranes (Southern, Northern and Western Blot).

CELLSTAR® FourWell Plate™
Subdivided plate for microscopic applications

The CELLSTAR® FourWell Plate™ facilitates the cultivation of cells and the storage of microscopic slides in an HTS-compatible plate complying with the ANSI standard. With its four subdivisions the plate offers space for four individual slides with standard dimensions and enables four parallel experiments. Cells and tissue samples cultivated on these slides can be supplied quickly with fresh media and can be examined directly under a microscope. Thereafter, samples can also be fixed and analysed by immunohisto- and immunocytochemical techniques. Notches on the left side and a numbering of each individual compartment make a laterally reversed usage or confusion of samples impossible.
A semicircular recession at the top and at the bottom of each compartment enables easy removal and handling of slides. The two pins at the left and right side of the semicircular recession hinder the microscopic slide to adjoin the outer rim of the plate and to fully cover the recession. This guarantees that the slide can always be removed manually from the compartment even if it adheres to the plate bottom due to capillary forces.
Beyond the indicated microscopic applications, the CELLSTAR® FourWell Plate™ can also be used as a liquid container or disposable for the denaturation, hybridisation and washing of membranes (Southern, Northern and Western Blot).



9607 7307

670 180
670 190

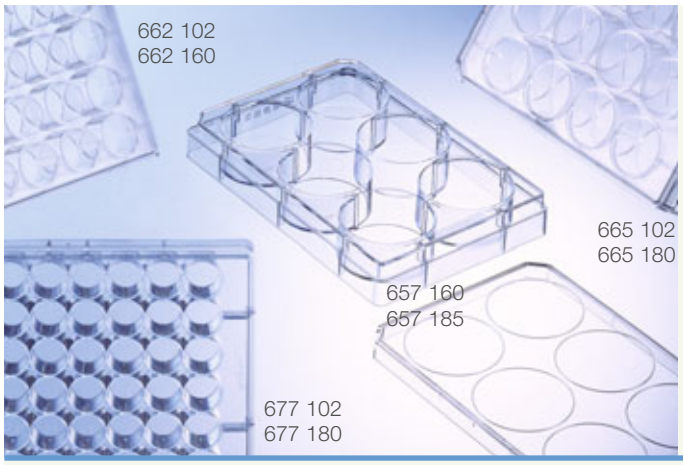
OneWell Plate™
FourWell Plate™

CELLSTAR® OneWell Plate™ (non-sterile) for bacteriological applications p. 118

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Cat.-No.	670 180	670 190	9607 7307
Description	OneWell Plate™	OneWell Plate™	FourWell Plate™
No. of chambers	1	1	4
Length [mm] x width [mm]	127.8 x 85.5	127.8 x 85.5	127.8 x 85.5
Height [mm]	14.4	14.4	14.4
Total volume [ml]	113.7	113.7	18.6/well
Growth area [cm^2]	95	95	-
Notches	+	+	+
TC surface treatment	+	-	-
Sterile	+	+	+
Lid	+	+	+
Quantity per bag/case	8/32	8/32	8/32

CELLSTAR® Cell Culture Multiwell Plates



Cell Culture Multiwell Plates

6, 12, 24, 48 Well Format

Cell Culture Inserts p. 57-61

Cell culture multiwell plates are available in the following versions:

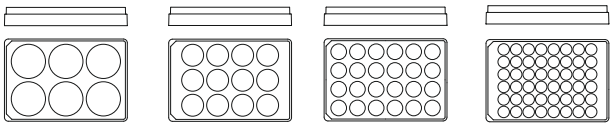
- With hydrophilic surface (TC surface treatment) for improved cell adhesion
- With hydrophobic surface for suspension cultures and hybridoma cells

Properties

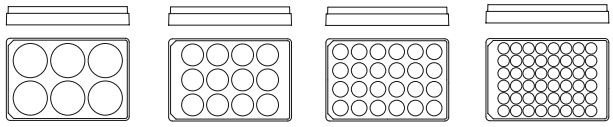
- High clarity and low autofluorescence
- Lid enables optimal gas exchange with the lowest possible evaporation
- Single position lids to prevent cross-contamination
- Alphanumeric well coding
- Compatible with common instruments and automated systems. For further information please visit our website.
- Easy-to-open packaging

! For applications with larger working volume, a 6 and 12 well ThinCert™Plate with deeper wells is available → p. 62

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cell Culture Multiwell Plates for Adherent Cell Cultures				
Cat.-No.	657 160	665 180	662 160	677 180
Well format	6 well	12 well	24 well	48 well
Growth area per well [cm²]	9.6	3.9	1.9	1.0
Working volume per well [ml]	2 – 5	2 – 4	0.5 – 1.5	0.5 – 1
TC surface treatment	+	+	+	+
Sterile	+	+	+	+
Lid	+*)	+*)	+*)	+*)
Quantity per bag/case	1/100	1/100	1/100	1/100



Cell Culture Multiwell Plates for Suspension Cultures				
Cat.-No.	657 185	665 102	662 102	677 102
Well format	6 well	12 well	24 well	48 well
Total volume per well [ml]	16	6.5	3.3	1.7
TC surface treatment	-/suspension	-/suspension	-/suspension	-/suspension
Sterile	+	+	+	+
Lid	+*)	+*)	+*)	+*)
Quantity per bag/case	1/100	1/100	1/100	1/100

*) with condensation rings

CELLSTAR® Cell Culture Microplates

Cell culture treated microplates are available in the following versions: 96, 384, 1536 well format

Properties
- Improved cell adhesion through physical surface treatment
- Compatible with automated systems
- Alphanumeric well coding

! An overview of all 96 well, 384 well and 1536 well microplates listed in this catalogue can be found in the Technical Appendix → p. 223-225

! Detailed technical information on microplates
→ p. 66-69 HTS microplates
→ p. 104-105 Immunology
→ p. 220 Barcode labelling of microplates

Further literature on cell culture treated microplates
→ **Application Note "Establishing a cell culture assay based on TR-FRET for screening G-Protein-coupled receptors"** (F074 058)
→ **Application Note "Selection of cell culture surfaces for the adipogenic differentiation of hMSCs"** (F010 003)

96 Well Polystyrene Cell Culture Microplates

Cell culture treated 96 well microplates are available in the following versions:
- With U-, V- and F-bottom
- Clear, black and white
- Standard or half area microplates
- Black and white "clear bottom" plates (µClear®)
- Chimney well design, raised wells and condensation rings in lids prevent cross-contamination
- With or without lid
- Improved cell adhesion through physical surface treatment
- Barcode-labelled on request

Properties
- Lid enables gas exchange with minimal evaporation
- High clarity of the clear microplates for optimal microscopic examinations
- Stackable
- Alphanumeric well coding
- Individually wrapped peel-off bags
- Consecutive lot numbering

Well Profile
Depending on the application, the well profile is a key feature in a 96 well cell culture microplate. For further information and figures on the well profiles see → p. 70-71.

1. U-Bottom
The "U" describes the round bottom shape.
- No sharp corners to facilitate easy and residue-free pipetting
- Suitable for +/- analyses
- Working volume: 40 – 280 µl

2. V-Bottom
The "V" stands for the conically tapered well bottom.
- For precise pipetting
- Suitable for +/- analyses
- Working volume: 40 – 200 µl

3. F-Bottom / Standard (ST)
The "F" refers to the flat well bottom.
- Excellent optical properties
- For precise optical measurements
- For microscopic applications (bottom reading)
- Cell growth area: 32 mm^2
- Working volume: 25 – 340 µl

4. F-Bottom / Chimney Well
The chimney well cell culture microplate has the same well profile as the standard F-bottom plate. The difference to the standard plate is the chimney-like arrangement of the wells i.e. each well stands on its own. Therefore the risk of contamination from sample material being carried over is minimised.
- Cell growth area: 34 mm^2
- Working volume: 25 – 340 µl

µClear® / Solid Bottom
Clear bottom microplates have pigmented walls and a transparent thin film bottom, the so-called µClear® bottom. In contrast to our standard microplates with a solid polystyrene bottom, they are ideal for cell culture and microscopic applications using fluorescence or luminescence detection methods.

Half Area Microplates
For many applications, a reduction of the sample volume is an important feature. Beside high-format plates, the 96 well half area microplates offer an interesting alternative here. They can be pipetted automatically as well as manually without any problem and allow a reduction of the sample volume up to 50 %.
- Cell growth area: 15.0 mm^2
- Working volume: 15 – 175 µl

! **Bulk Packaging**
For selected products Greiner Bio-One also offers user-friendly bulk packaging (Fig. 1). Additional products are available in bulk pack upon request.

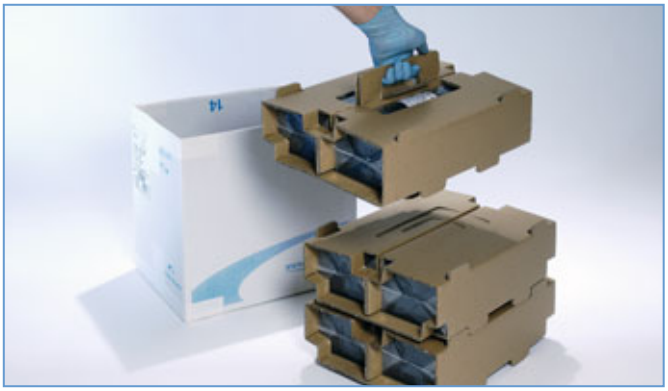
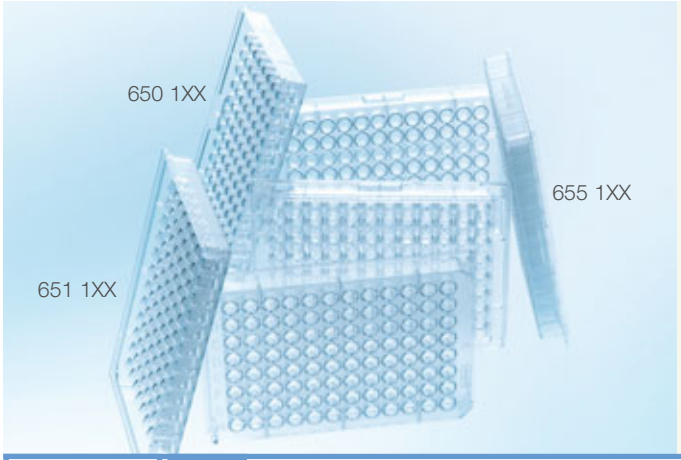


Figure 1: User-friendly bulk packaging



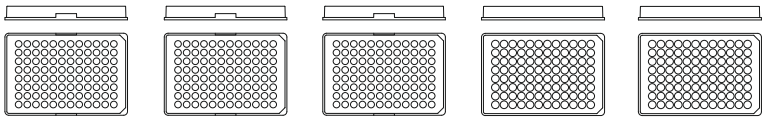
96 Well Polystyrene Cell Culture / Supension Culture Microplates

solid bottom, clear

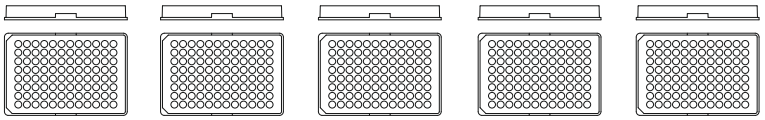
96 Well Microplates p. 71
Sealers, Lids and CapMats p. 204-209
Barcode Labelling p. 220

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic

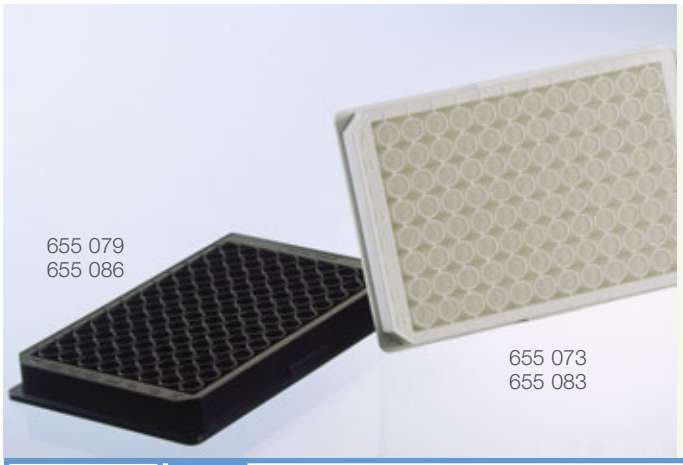


	650 160	650 180	650 185	651 160	651 180
Cat.-No.					
Well profile	U-bottom	U-bottom	U-bottom	V-bottom	V-bottom
Bottom	solid	solid	solid	solid	solid
Colour	clear	clear	clear	clear	clear
Growth area per well [mm²]	35	35	-	28	28
Working volume per well [µl]	40 – 280	40 – 280	40 – 280	40 – 200	40 – 200
TC surface treatment	+	+	-/suspension	+	+
Sterile	+	+	+	+	+
Lid	-	+	+	-	+
Quantity per bag/case	1/100	1/100	1/60	1/100	1/100



	655 160	655 162	655 180	655 182	655 185
Cat.-No.					
Well profile	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well
Bottom	solid	solid	solid	solid	solid
Colour	clear	clear	clear	clear	clear
Growth area per well [mm²]	34	34	34	34	-
Working volume per well [µl]	25 – 340	25 – 340	25 – 340	25 – 340	25 – 340
TC surface treatment	+	+	+	+	-/suspension
Sterile	+	+	+	+	+
Lid	-	-	+*)	+*)	+*)
Quantity per bag/case	1/100	5/100	1/100	10/160	1/60

*) with condensation rings



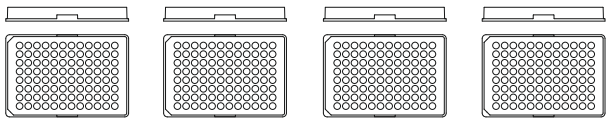
96 Well Polystyrene Cell Culture Microplates

solid bottom, white / black

- 96 Well Microplates p. 72
- Sealers, Lids and CapMats p. 204-209
- Barcode Labelling p. 220

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic



Cat.-No.	655 073	655 083	655 079	655 086
Well profile	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well
Bottom	solid	solid	solid	solid
Colour	white	white	black	black
Growth area per well [mm²]	34	34	34	34
Working volume per well [µl]	25 – 340	25 – 340	25 – 340	25 – 340
TC surface treatment	+	+	+	+
Sterile	+	+	+	+
Lid	-	+*)	-	+*)
Quantity per bag/case	10/40	8/32	10/40	8/32

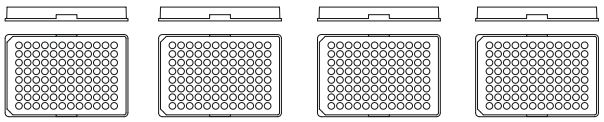
*) with condensation rings

96 Well Polystyrene Cell Culture Microplates

µClear®, white / black

96 Well Microplates p. 72
Sealers, Lids and CapMats p. 204-209
Barcode Labelling p. 220

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	655 088	655 098	655 087	655 090
Well profile	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well
Bottom	µClear®	µClear®	µClear®	µClear®
Colour	white	white	black	black
Growth area per well [mm²]	34	34	34	34
Working volume per well [µl]	25 – 340	25 – 340	25 – 340	25 – 340
TC surface treatment / Sterile	+/+	+/+	+/+	+/+
Lid	-	+*)	-	+*)
Quantity per bag/case	10/40	8/32	10/40	8/32

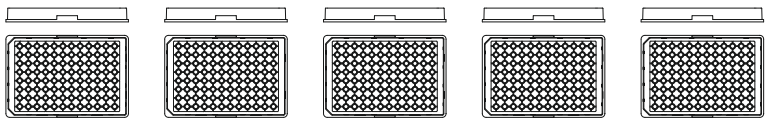
*) with condensation rings

96 Well Half Area Polystyrene Cell Culture Microplates

solid bottom, clear / white / black
µClear®, white / black

96 Well Half Area Microplates p. 73

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

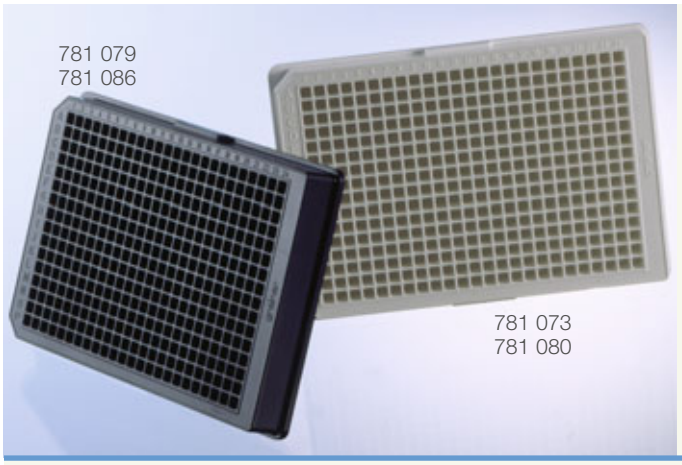


Cat.-No.	675 180	675 083	675 086	675 098	675 090
Well profile	half area	half area	half area	half area	half area
Bottom	solid	solid	solid	µClear®	µClear®
Colour	clear	white	black	white	black
Growth area per well [mm²]	15	15	15	15	15
Working volume per well [µl]	15 – 175	15 – 175	15 – 175	15 – 175	15 – 175
TC surface treatment / Sterile	+/+	+/+	+/+	+/+	+/+
Lid	+	+	+	+	+
Quantity per bag/case	8/32	8/32	8/32	8/32	8/32

384 Well Polystyrene Cell Culture Microplates

384 well cell culture microplates are physically surface treated for improved cell adhesion and available in the following versions:

- Clear, white or black colour
- White or black “clear bottom” plates (µClear®)
- 384 well Small Volume™ HiBase and LoBase microplates
- Barcode-labelled on request (→ p. 220)



384 Well Polystyrene Cell Culture Microplates

solid bottom, clear / white / black

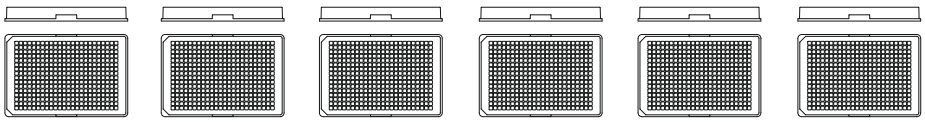
- 384 Well Microplates p. 77
- Sealers, Lids and CapMats p. 204-209
- Barcode Labelling p. 220

Properties:

- Lid enables gas exchange with the lowest possible evaporation
- High clarity of the clear microplates for optimal microscopic examinations
- Stackable
- Alphanumeric well coding

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic



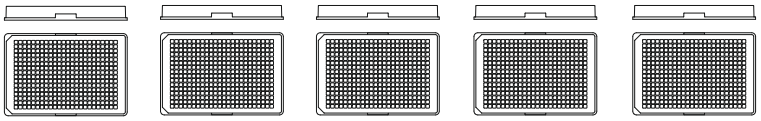
Cat.-No.	781 165	781 182	781 073	781 080	781 079	781 086
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	solid	solid	solid
Colour	clear	clear	white	white	black	black
Growth area per well [mm²]	10	10	10	10	10	10
Working volume per well [µl]	15 – 110	15 – 110	15 – 110	15 – 110	15 – 110	15 – 110
TC surface treatment	+	+	+	+	+	+
Sterile	+	+	+	+	+	+
Lid	-	+	-	+	-	+
Quantity per bag/case	10/40	8/32	10/40	8/32	10/40	8/32

384 Well Polystyrene Cell Culture Microplates

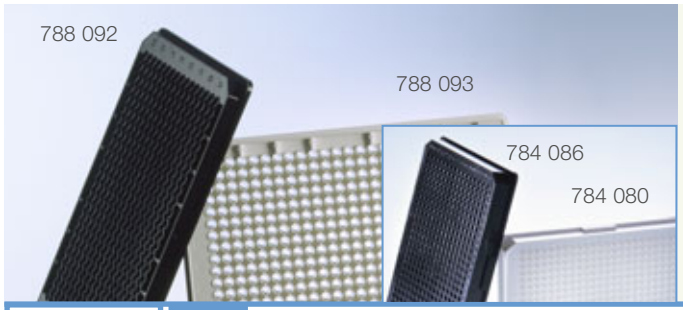
µClear®, white / black

384 Well Microplates p. 78
Sealers, Lids and CapMats p. 204-209
Barcode Labelling p. 220

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	781 093	781 098	781 092	781 091	781 090
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	µClear®	µClear®	µClear®	µClear®	µClear®
Colour	white	white	black	black	black
Growth area per well [mm²]	10	10	10	10	10
Working volume per well [µl]	15 – 110	15 – 110	15 – 110	15 – 110	15 – 110
TC surface treatment	+	+	+	+	+
Sterile	+	+	+	+	+
Lid	-	+	-	+	+
Quantity per bag/case	10/40	8/32	10/40	8/32	20/120

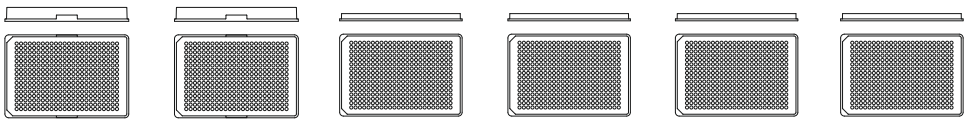


384 Well Small Volume™ HiBase/ LoBase Cell Culture Microplates

solid bottom, white / black
µClear®, white / black

384 Well Microplates p. 81

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	784 080	784 086	788 073	788 086	788 093	788 092
Well profile	Small Volume™	Small Volume™	Small Volume™	Small Volume™	Small Volume™	Small Volume™
Bottom	solid	solid	solid	solid	µClear®	µClear®
Colour	white	black	white	black	white	black
Growth area per well [mm²]	2.7	2.7	2.7	2.7	2.7	2.7
Working volume per well [µl]	4 – 25	4 – 25	4 – 25	4 – 25	4 – 25	4 – 25
TC surface treatment	+	+	+	+	+	+
Sterile	+	+	+	+	+	+
Lid	+	+	-	+	-	-
Quantity per bag/case	8/32	8/32	10/80	15/60	10/80	10/80
Plate design	HiBase	HiBase	LoBase	LoBase	LoBase	LoBase

1536 Well Cell Culture Microplates

1536 well cell culture microplates are physically surface-treated for improved cell adhesion and available in the following versions:

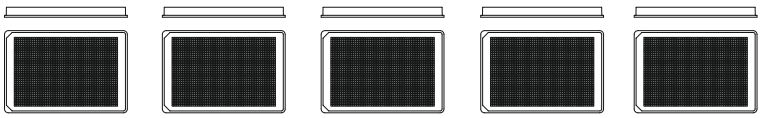
- In clear, white or black polystyrene
- As clear bottom variants (µClear®)
- LoBase and HiBase version (→ p. 84-85)
- Barcode-labelled on request (→ p. 220)

1536 Well Cell Culture Microplates
HiBase

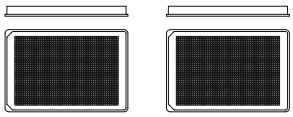
- 1536 Well Microplates p. 84
- Sealers, Lids and CapMats p. 204-209
- Barcode Labelling p. 220

Free of detectable DNase, RNase, human DNA
non-pyrogenic

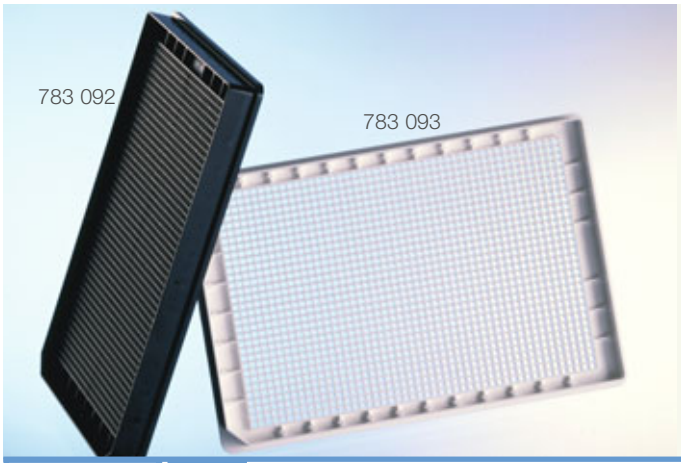
non-cytotoxic



	782 180	782 073	782 080	782 078	782 086
Cat.-No.					
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	solid	solid
Colour	clear	white	white	black	black
Growth area per well [mm²]	2.3	2.3	2.3	2.3	2.3
Working volume per well [µl]	3 – 10	3 – 10	3 – 10	3 – 10	3 – 10
TC surface treatment	+	+	+	+	+
Sterile	+	+	+	+	+
Lid	+	-	+	-	+
Quantity per bag/case	1/32	15/60	10/40	15/60	10/40
Plate design	HiBase	HiBase	HiBase	HiBase	HiBase



	782 093	782 092
Cat.-No.		
Well profile	F-bottom	F-bottom
Bottom	µClear®	µClear®
Colour	white	black
Growth area per well [mm²]	2.3	2.3
Working volume per well [µl]	3 – 10	3 – 10
TC surface treatment	+	+
Sterile	+	+
Lid	-	-
Quantity per bag/case	15/60	15/60
Plate design	HiBase	HiBase

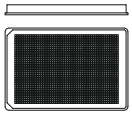
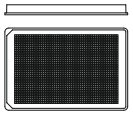


1536 Well Cell Culture Microplates

LoBase

1536 Well Microplates p. 85
Sealers, Lids and CapMats p. 204-209
Barcode Labelling p. 220

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Cat.-No.	783 093	783 092
Well profile	F-bottom	F-bottom
Bottom	µClear®	µClear®
Colour	white	black
Growth area per well [mm²]	2.3	2.3
Working volume per well [µl]	3 – 10	3 – 10
TC surface treatment	+	+
Sterile	+	+
Lid	-	-
Quantity per bag/case	15/60	15/60
Plate design	LoBase	LoBase

CELLSTAR® Cell Culture Tubes

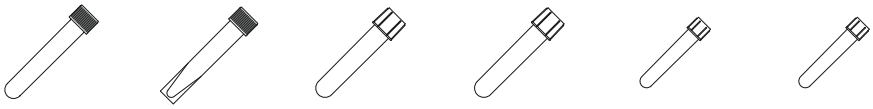
Polystyrene Cell Culture Tubes

Tubes p.125-131

- Made of high-grade polystyrene
- Improved cell adhesion through physical surface treatment
- Available with screw cap, bayonet cap or two-position vent stopper

! The dimensions and volumes of our tubes are only nominal values. For exact dimensions and volumes, please refer to the product data sheets on our website www.gbo.com/bioscience.

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	163 160	164 160	191 160	191 170	120 160	120 190
ø [mm] x height [mm]	17 x 100	16.8 x 100	18 x 95	18 x 95	12.4 x 75	12.4 x 75
Nominal volume [ml]	12	12	14	14	4.5	4.5
Working volume [ml]	12	12	12.5	12.5	4	4
TC surface treatment	+	+	+	+	+	+
Sterile	+	+	+	+	+	+
Support skirt	-	+	-	-	-	-
Screw cap	red	-	-	-	-	-
Bayonet cap*)	-	red	-	-	-	-
Two-position vent stopper	-	-	+	+	+	+
Quantity per bag/case	5/1000	5/1000	1/750	100/1200	1/1000	25/2000

*) open by a 1/3 turn

CELLSTAR® CELLreactor™ – 15 ml and 50 ml Polypropylene Tube with Filter Screw Cap

The CELLSTAR® CELLreactor™ tube can be used as small bioreactor for suspension and spheroid cell culture, facilitating miniaturisation of large-scale setups and maximising the number of parallel experiments.

Each CELLreactor™ tube cap features several holes and a specific USP Class VI certified PTFE-coated capillary pore filter membrane with a pore size of 0.2 µm to guarantee maximal sterility while providing excellent gas exchange. In case the aeration has to be reduced, individual openings can be sealed.

Agitation of internal liquids is achieved with standard shaking lab equipment minimising foam formation and shearing forces induced by integrated mixing devices. Compared to cell culture and spinner flask as well as other cultivation disposables, no transfer for cell harvest is required. Based on the conical design, the tubes fit in standard 15 ml / 50 ml centrifuge rotors and cells can be spun down in the same tube.

In addition to cell culture applications, the CELLSTAR® CELLreactor™ tube can also be applied for the expansion of aerobic bacteria, yeast or other microorganisms in shaken cultures as well as storage of components and liquids requiring gas exchange. For anaerobic culture, the CELLSTAR® polypropylene tubes with standard cap (→ p. 129-130) can be used.

! Further information on CELLreactor™:

→ **Application Note: Cultivation of Suspension and Hybridoma Cells in CELLSTAR® CELLreactor™ Tubes** (F073 918)

CELLreactor™ 15 ml and 50 ml

CELLSTAR® polypropylene tubes with standard cap p. 129-130

Advantages:
- Facilitates a high number of parallel experiments
- Flexible working volume
- Maximal sterility and excellent gas exchange
- Conical tube design and in-tube cell harvest

Applications:
- Bioreactor for suspension and spheroid cells
- Expansion of aerobic bacteria, yeast and microorganisms
- Storage of components and liquids requiring gas exchange

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic


Cat.-No.	188 240	227 245
Description	CELLreactor™ 15 ml tube with filter cap	CELLreactor™ 50 ml tube with filter cap
Bottom design	conical	conical
ø [mm] x height [mm]	17 x 120	30 x 115
Total volume [ml]	15	50
Working volume [ml]	1 – 5	1 – 35
Sterile	+	+
Colour	natural	natural
Filter screw cap	blue	blue
Graduation	blue	blue
Writing field	white	white
Quantity per bag/case	20/300	20/500

New

EASYstrainer™ Cell Strainers

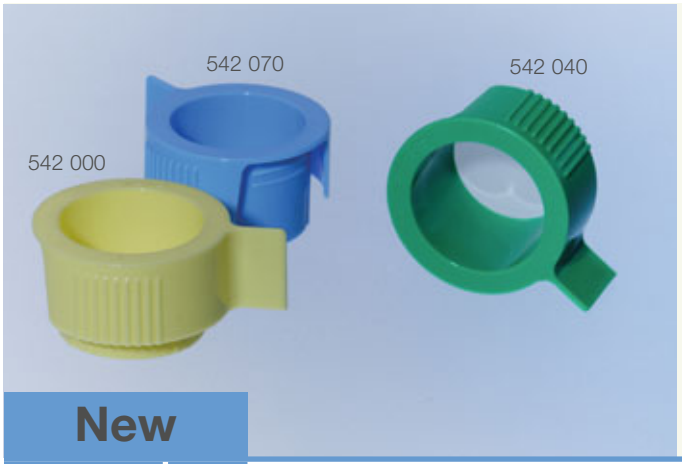
EASYstrainer™ is a novel product for the fast and safe filtration of cell suspensions such as those from tissue dissociation or for flow cytometry. The filter fits all standard 50 ml tubes and is available with filter mesh sizes of 40, 70 and 100 µm.

The innovative design of EASYstrainer™ allows for secure, aseptic handling with a clearly reduced risk of contaminating the filtered cell suspension. The grip ridges on the skirt of the unit in conjunction with a handle allow the unit to be manipulated safely and easily and so reduce the risk of accidental contact with the wetted filter. This significantly lowers the chance of contaminating the sample during the filtration process. In addition, the single blister pack allows for convenient and aseptic removal of the unit from its packaging.

A striking feature of EASYstrainer™ is the venting slot between tube and filter. This feature allows excess air to escape from the tube passively as to not create a vacuum or slow the flow rate. Thus, problems seen with other strainer brands such as liquid trapping between tube and filter as well as overspill of cell suspension are avoided.

INFORMATION

Watch our video
"EASYstrainer™ cell sieves"



New

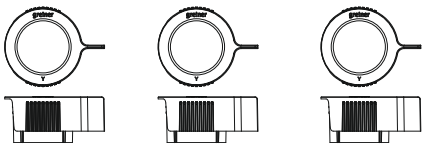
Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic

EASYstrainer™

CELLSTAR® polypropylene tubes p. 129-130

- Three color-coded mesh sizes
- Fits all standard 50 ml tubes
- Handle and ridged skirt for improved aseptic handling
- Venting slot for fast filtration
- No liquid overspill
- Convenient blister pack



Cat.-No.	542 040	542 070	542 000
Description	EASYstrainer™	EASYstrainer™	EASYstrainer™
Mesh size [µm]	40	70	100
Colour code	green	blue	yellow
Venting slot	+	+	+
Sterile	+	+	+
Quantity per blister/case	1/50	1/50	1/50

CELLMASTER™ Cell Culture Roller Bottles

The cultivation of cells as mass cultures has become increasingly important over the past few decades and has led to further developments of high-quality products. This includes items such as roller bottles which are used for the production of virus vaccines or recombinant proteins used for therapeutic approaches. CELLMASTER™ roller bottles are made from polystyrene (PS) or polyethylene terephthalate (PET). These materials, like those used for the screw caps (HDPE) and the hydrophobic membrane (PET/PTFE) of the filter screw caps (Fig. 1), comply with the quality standards of the U.S. Pharmacopoeia. The complete end product is USP Class VI certified. All roller bottles are sterilised by irradiation. Pyrogen testing is conducted using the kinetic turbidimetric "Limulus Amoebocyte Lysate" (LAL) assay in accordance with FDA guidelines (12/8) with a tolerance level of 0.03 EU/ml. Since roller bottles are manufactured using a two-phase blow-moulding procedure, the bottles are seamless ruling out the risk of liquid leaking from a faulty seam.

- PS or PET roller bottles depending on the cultivation requirements
- Particularly high stability and clarity
- Different sizes (116 x 276 mm, 122 x 271 mm, 122 x 275 mm, 122 x 500 mm) with or without a radially ribbed surface for an expanded growth area (850 cm^2, 1700 cm^2, 2125 cm^2, 4250 cm^2)
- Seamless blow-moulding technique rules out leaking seams
- Free of detectable endotoxins (tolerance limit 0.03 EU/ml)
- Graduations from 150 to 2000 ml
- Lot number and best-before date to ensure lot traceability for roller bottles made of polystyrene
- Certified USP Class VI end product testing
- Safety screw cap for tightly closed, contamination-free cultivation
- Short screw cap thread for quick and easy opening of all roller bottles made of polystyrene

Figure 1: Filter screw cap

CELLMASTER™ Roller Bottle Nomenclature:

- The product range includes two different sizes, a short and a long form. The sizes are labelled as **X** (short) and **XL** (long)
- Both sizes are available with a smooth or a radially ribbed surface. The ribbed design increases the growth area of the roller bottle without changing the height. The **figure** in front of the **X** or **XL** indicates the multiplication factor by which the surface of a ribbed type increases compared to the short smooth roller bottle with 850 cm^2
- Short forms with a ribbed design have a 2-fold or 2.5-fold expanded growth area (2 X or 2.5 X)
- Long roller bottles with a ribbed design have a 5-fold expanded growth area (5 XL) compared to the smooth short form (1 X)

Polystyrene Roller Bottles

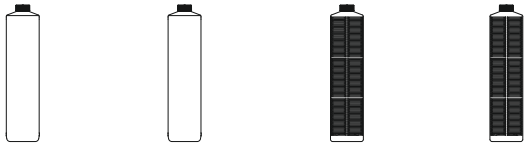
Polystyrene Roller Bottles

- Particularly high stability and optical clarity
- Improved cell adhesion through physical surface treatment
- Thread enables quick opening with a ⅔ turn
- Screw caps with larger knurls for improved grip and ease of opening/closing
- Lot number and best-before date on each roller bottle
- Sterile, individually packed screw caps available:
  – Standard screw cap (Cat.-No. 383 361)
  – Filter screw cap (Cat.-No. 383 382)
- Nomenclature p. 34
- Double-bag bulk packaging (suited for clean room use) available on request

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic

	680 060	680 065	681 060	681 065	681 070	681 075
Cat.-No.						
Description	1 X	1 X	2 X	2 X	2.5 X	2.5 X
Surface	smooth	smooth	ribbed	ribbed	ribbed	ribbed
ø [mm] x height [mm]	122 x 271	122 x 271	122 x 271	122 x 271	122 x 271	122 x 271
Growth area [cm²]	850	850	1700	1700	2125	2125
Total volume [ml]	2520	2520	2280	2280	2300	2300
TC surface treatment	+	+	+	+	+	+
Sterile	+	+	+	+	+	+
Standard screw cap	+	+	+	+	+	+
Quantity per bag/case	2/24	24	2/24	24	2/24	24



	682 012	682 060	682 075	682 070
Cat.-No.				
Description	1 XL	1 XL	5 XL	5 XL
Surface	smooth	smooth	ribbed	ribbed
ø [mm] x height [mm]	122 x 500	122 x 500	122 x 500	122 x 500
Growth area [cm²]	1700	1700	4250	4250
Total volume [ml]	4970	4970	4640	4640
TC surface treatment	+	+	+	+
Sterile	+	+	+	+
Standard screw cap	+	+	+	+
Quantity per bag/case	12	1/12	12	1/12

Polystyrene Filter Cap Roller Bottles

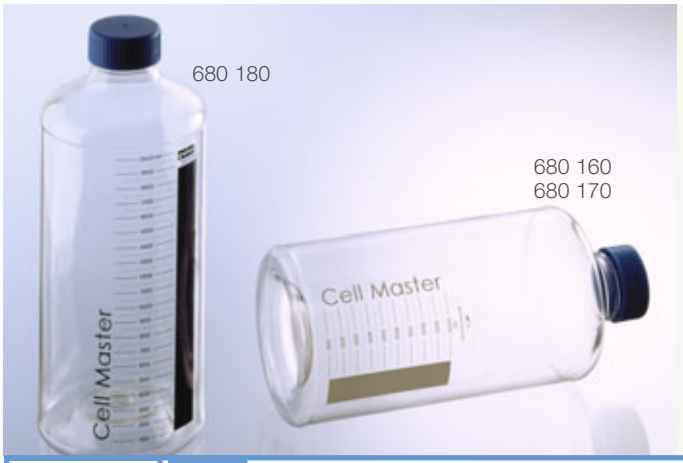
- Particular high stability and optical clarity
- Improved cell adhesion through physical surface treatment
- Thread enables quick opening with a ⅔ turn
- Screw caps with larger knurls for improved grip and ease of opening/closing
- Lot number and best-before date on each roller bottle
- Sterile, individually packed screw caps available:
  – Standard screw cap (Cat.-No. 383 361)
  – Filter screw cap (Cat.-No. 383 382)
- Nomenclature p. 34
- Double-bag bulk packaging (suited for clean room use) available on request

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Cat.-No.	680 058	680 068	682 015	682 065
Description	1 X	1 X	1 XL	1 XL
Form	short	short	long	long
Surface	smooth	smooth	smooth	smooth
ø [mm] x height [mm]	122 x 271	122 x 271	122 x 500	122 x 500
Growth area [cm²]	850	850	1700	1700
Total volume [ml]	2520	2520	4970	4970
TC surface treatment	+	+	+	+
Sterile	+	+	+	+
Filter screw cap	+	+	+	+
Quantity per bag/case	2/24	24	12	1/12

Cat.-No.	681 062	681 072	682 078
Description	2 X	2.5 X	5 XL
Form	short	short	long
Surface	ribbed	ribbed	ribbed
ø [mm] x height [mm]	122 x 271	122 x 271	122 x 500
Growth area [cm²]	1700	2125	4250
Total volume [ml]	2280	2300	4640
TC surface treatment	+	+	+
Sterile	+	+	+
Filter screw cap	+	+	+
Quantity per bag/case	2/24	2/24	1/12

Polyethylene Terephthalate (PET) Roller Bottles



Polyethylene Terephthalate (PET) Roller Bottles

- PET material with high impact resistance and gas permeability
- Surface suitable for many adherent cell lines
- All PET(G) roller bottles have a standard screw cap
- PETG (glycolised PET) with high stability at a consistent level of transparency
- Break-proof
- Nomenclature p. 34

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic

					
Cat.-No.	**680 160**	**680 170**	**680 180*)**	**681 160**	**681 170**
Description	1 X	1 X	1 X	2 X	2.5 X
Material	PET	PET	PET	PETG	PETG
Form	short	short	short	short	short
Surface	smooth	smooth	smooth	ribbed	ribbed
ø [mm] x height [mm]	116 x 276	116 x 276	116 x 276	122 x 275	122 x 275
Growth area [cm²]	850	850	850	1700	2125
Total volume [ml]	2300	2300	2300	2450	2500
Sterile	+	+	+	+	+
Quantity per bag/case	1/18	30	1/18	20	5/20

*) black graduation

Advanced TC™ Cell Culture Vessels

For the propagation of fastidious cells like primary or sensitive cells as well as cells cultivated under restricted growth conditions (serum-free or serum-reduced) Greiner Bio-One offers the Advanced TC™ polymer modification. Based on an innovative technique, the cell culture surface is modified to promote cellular features and functions. Enhanced cell attachment (Fig. 1) and higher proliferation rates (Fig. 2) improve and accelerate cell expansion. Furthermore, the Advanced TC™ surface facilitates consistent and homogenous cell attachment increasing the overall cell yield and reducing cell loss, for example during automated washing steps.

The positive effect on cell morphology is particularly apparent during cultivation of sensitive cells (Fig. 3), serum deprivation or after cellular stress induced by transfection or transduction processes. Moreover, cells cultivated on the Advanced TC™ surface exhibit higher transgene activity after gene transfer/ insertion (Fig. 4).

Due to the production process, the modification of the polymer assures consistant and reproducible product quality. Transport and storage can be carried out at room temperature.

Applications:
- Cultivation of fastidious and sensitive cells
- Usage of serum-reduced or serum-free media
- Differentiation of semi-adherent cells
- Transfection
- Transduction
- Automation/High-throughput analysis

Advantages:
- Improved cell adherence
- Consistent cell attachment
- Homogenous cell growth
- In-vivo like morphology
- Increased cell yield
- Optimal cultivation conditions for sensitive cells
- Permits usage of serum-reduced or serum-free media
- Reduced cell loss due to (automated) washing steps
- Improved assay consistency
- Storage at room temperature
- 2-year shelf life

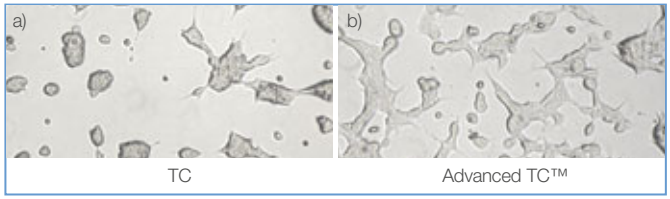


Figure 1:
HEK 293 cells were seeded with a concentration of 20,000 cells/well in a 96 well microplate and cultivated in serum-free media at 37 °C and 5 % CO_2. After 48 hours cells are semi-adherent on the standard tissue culture surface (a) whereas on the Advanced TC™ surface (b) HEK 293 cells display improved attachment and their cell-specific morphology.

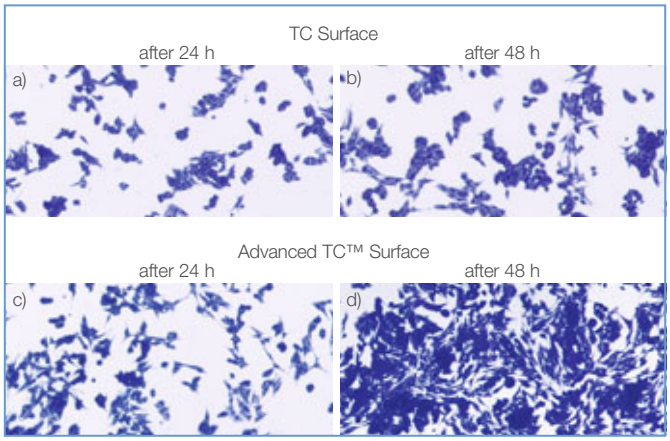


Figure 2:
SKNMC cells were seeded with a concentration of 20,000 cells/well in a 96 well microplate with standard tissue culture surface (a, b) and Advanced TC™ surface (c, d) and cultivated at 37 °C and 5 % CO_2 for 24 or 48 hours respectively. Cells were stained with crystal violet to identify living cells. Due to the increased proliferation rate higher cell densities can be detected on the Advanced TC™ surface at both time points.

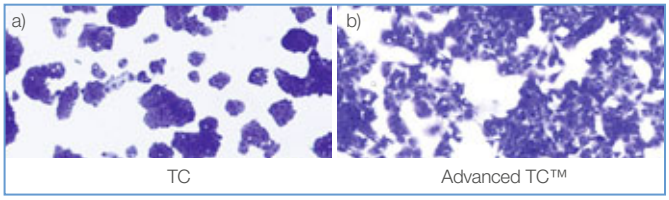


Figure 3:
HepG2 cells were seeded with a concentration of 20,000 cells/well in a 96 well microplate with standard tissue culture surface (a) and Advanced TC™ surface (b), cultivated under identical conditions for 48 hours and stained with crystal violet. Only on the Advanced TC™ surface cells display their in-vivo like morphology.

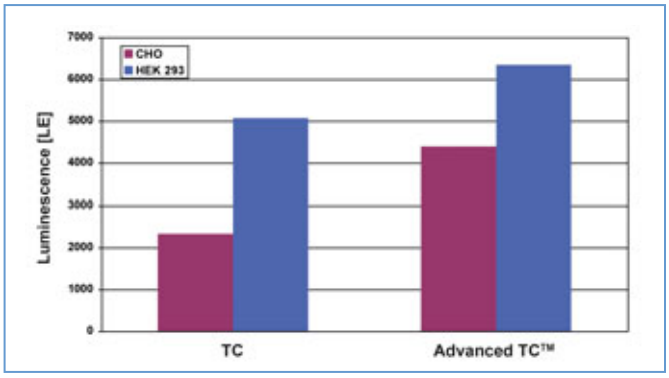
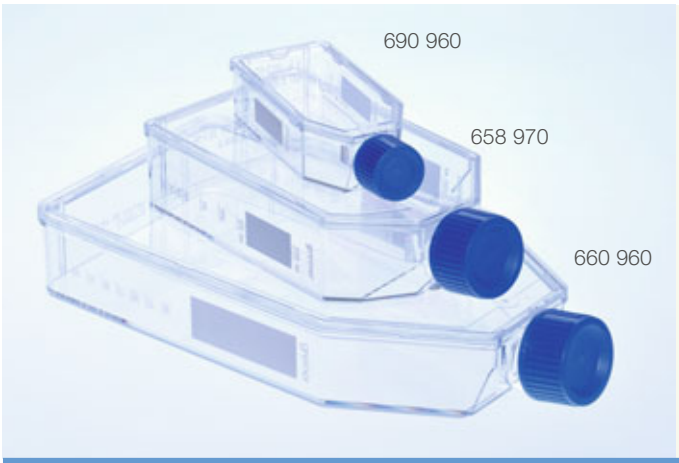


Figure 4:
CHO and HEK 293 cells were seeded in a 96 well microplate with a concentration of 40,000 cells/well or 100,000 cells/well respectively, cultivated at 37 °C and 5 % CO_2 for 24 hours and thereafter transfected with the pCMV- GLuc-vector. Both cell lines exhibit raised Luciferase activity on the Advanced TC™ surface.

!

Further information on Advanced TC™

→ **Forum No. 12: Advanced TC™: An innovative surface improving cellular assays** (F071 104)
→ **Application Report "Advanced TC™ for improving the cultivation / differentiation of embryonic stem cells"** (F076 036)

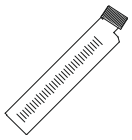


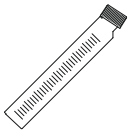
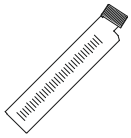
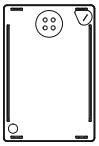
Advanced TC™

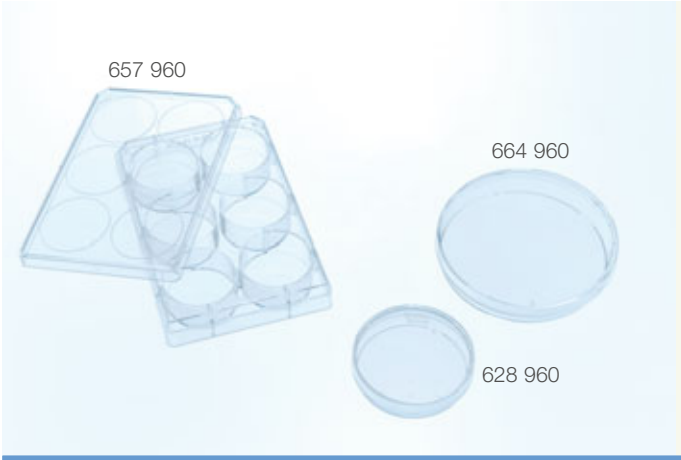
Standard Cell Culture Flasks
Filter Cap Cell Culture Flasks

Standard Cell Culture Flasks p. 16
Filter Cap Cell Culture Flasks p. 17

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Standard Cell Culture Flasks				
Cat.-No.	**690 960**	**658 970**	**660 960**	**661 960**
Flask design	-	-	flat	high
Growth area [cm²]	25	75	175	175
Total volume [ml]	50	250	550	650
Working volume [ml]	5 – 10	15 – 38	20 – 45	20 – 85
Advanced TC™	+	+	+	+
Sterile	+	+	+	+
Standard screw cap	blue	blue	blue	blue
Quantity per bag/case	10/200	5/120	5/50	4/40

Filter Cap Cell Culture Flasks					
Cat.-No.	**690 975**	**658 975**	**660 975**	**661 975**	**779 960**
Flask design	-	-	flat	high	AutoFlask™
Growth area [cm²]	25	75	175	175	83.6
Total volume [ml]	50	250	550	650	110
Working volume [ml]	5 – 10	15 – 38	20 – 45	20 – 85	20 – 40
Advanced TC™	+	+	+	+	+
Sterile	+	+	+	+	+
Filter screw cap	blue	blue	blue	blue	-
Colour code	-	-	-	-	blue
Barcode labelling	-	-	-	-	+
Quantity per bag/case	10/200	5/120	5/50	4/40	10/100



Advanced TC™
Cell Culture Dishes
Cell Culture Multiwell Plates

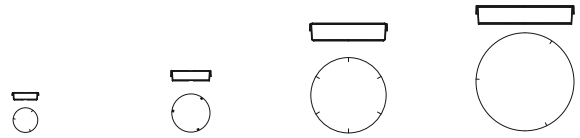
Cell Culture Dishes p. 20

Advanced TC™ CELLview™ Dish and Slide with Glass Bottom p. 52-53

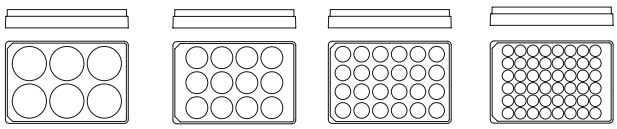
Cell Culture Multiwell Plates p. 22

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic



Cat.-No.	627 960	628 960	664 960	639 960
ø [mm] x height [mm]	35 x 10	60 x 15	100 x 20	145 x 20
Growth area [cm²]	8.7	21	58	143
Total volume [ml]	10	28	100	240
Working volume [ml]	5	6 – 7	16 – 17	25 – 27
Vents	+	+	+	+
Advanced TC™	+	+	+	+
Sterile	+	+	+	+
Quantity per bag/case	10/740	10/600	15/360	5/120



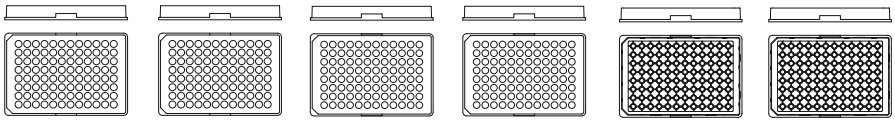
Cat.-No.	657 960	665 980	662 960	677 980
Well format	6 well	12 well	24 well	48 well
Growth area per well [cm²]	9.6	3.9	1.9	1.0
Working volume per well [ml]	2 – 5	2 – 4	0.5 – 1.5	0.5 – 1
Advanced TC™	+	+	+	+
Sterile	+	+	+	+
Lid	+	+	+*)	+*)
Quantity per bag/case	1/100	1/100	1/100	1/100

*) with condensation rings

Advanced TC™
96 Well Cell Culture Microplates

96 Well Cell Culture Microplates p. 24-26

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



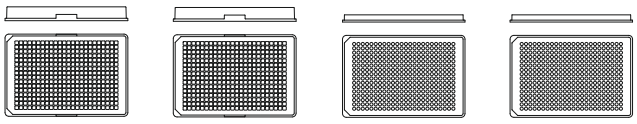
Cat.-No.	655 980	655 982	655 983	655 986	675 983	675 986
Well format	96 well	96 well	96 well	96 well	96 well	96 well
Well profile	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	half area	half area
Bottom	solid	solid	µClear®	µClear®	µClear®	µClear®
Colour	clear	clear	white	black	white	black
Growth area per well [mm²]	34	34	34	34	15	15
Working volume per well [µl]	25 – 340	25 – 340	25 – 340	25 – 340	15 – 175	15 – 175
Advanced TC™ / Sterile	+/+	+/+	+/+	+/+	+/+	+/+
Lid	+*)	+*)	+*)	+*)	+	+
Quantity per bag/case	1/100	10/160	8/32	8/32	8/32	8/32

*) with condensation rings

Advanced TC™
384 Well Cell Culture Microplates

384 Well Cell Culture Microplates p. 27-28

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	781 983	781 986	788 983	788 986
Well format	384 well	384 well	384 well	384 well
Well profile	F-bottom	F-bottom	Small Volume™	Small Volume™
Bottom	µClear®	µClear®	µClear®	µClear®
Colour	white	black	white	black
Growth area per well [mm²]	10	10	2.7	2.7
Working volume per well [µl]	15 – 110	15 – 110	4 – 25	4 – 25
Advanced TC™ / Sterile	+/+	+/+	+/+	+/+
Lid	+	+	+*)	+*)
Quantity per bag/case	8/32	8/32	15/60	15/60
Plate design			LoBase	LoBase

*) ultra low profile lid

CELLCOAT® – Protein Coated Cell Culture Vessels

The Greiner Bio-One CELLCOAT® product line comprises cell culture vessels which are coated with proteins of the extracellular matrix (Collagen Type I, Fibronectin, Laminin) or synthetic proteins (Poly-D- and Poly-L-Lysine). Beside an improved adhesion and proliferation of primary cells and various cell lines, CELLCOAT® plates are highly suitable for serum-free and serum-reduced cell cultivation and experiments which include additional washing steps or stressful procedures, e.g. transfection. Moreover, the differentiation of individual cell types can be enhanced through the protein-coating.

Applications:
- Improved adhesion
- Improved cell proliferation
- Cell adhesion assays
- Receptor-ligand binding studies
- Reduced-serum or serum-free cultivation
- Improved growth of primary cells
- Differentiation of individual cell types

Advantages:
- Increase in isolation and cultivation efficiency
- Ready-to-use products: immediate use, time-saving
- Consistent quality
- Poly-Lysine- and Collagen Type I-coated products storable at room temperature

CELLCOAT® products are produced under the highest purity and manufacturing standards according to validated procedures and established protocols. Consistent quality of the raw material and of the biological activity of the coating is ensured by conducting strict controls.

A protein coating of the growth surfaces with, for example, Poly-D-Lysine can improve the adhesion of cells (Fig. 1).

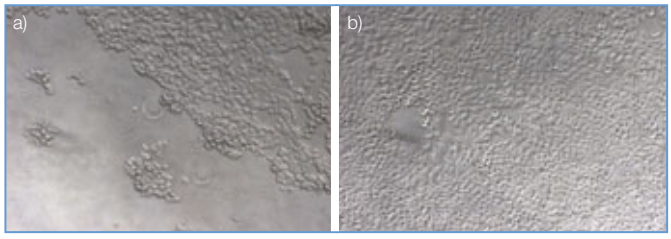


Figure 1:
a) HEK 293 cells 48 h after seeding and single washing with PBS on an uncoated, TC-treated surface
b) HEK 293 cells 48 h after seeding and single washing with PBS on a surface coated with Poly-D-Lysine

!

Upon request additional CELLCOAT® cell culture vessels are available with Collagen Type I, Poly-Lysine, Fibronectin and Laminin coating.

New: Double coating with Poly-D-Lysine and Laminin available

For selected CELLCOAT® products, Greiner Bio-One also offers user-friendly bulk packaging (Fig. 2)

Further information on CELLCOAT®

→ **Application Note "Influence of washing steps on cell attachment: Comparison of PDL-coated and cell culture treated microplates"** (F073 022)
→ **Application Note "Enhanced transfection efficiency on protein-coated microplates"** (F073 103)

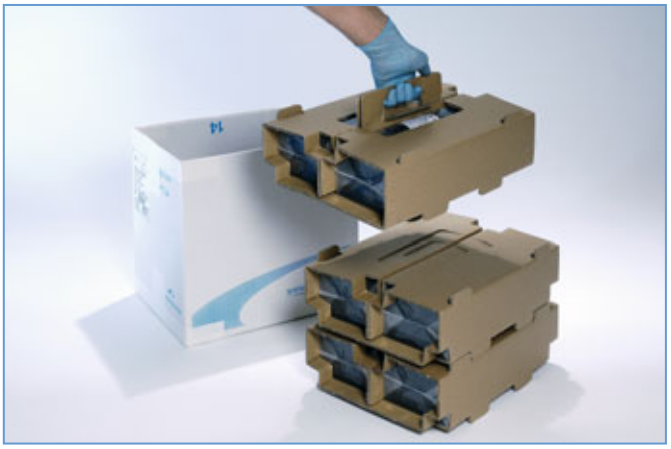


Figure 2: User-friendly bulk packaging

Collagen Type I CELLCOAT®

Collagen Type I is a protein of the extracellular matrix, an intercellular substance which *in vivo* influences adhesion, migration and proliferation among other processes. *In vivo* Collagen Type I is primarily found in the skin, tendon and bone. Collagen Type I represents one of the most important ECM proteins for in-vitro cell cultures. Many otherwise difficult-to-cultivate cells adhere to Collagen Type I and show a positive growth behaviour. For certain cell lines Collagen Type I also has a positive influence on differentiation and morphology.

- Promotion of cell adhesion, proliferation and growth of endothelial cells, mesenchymal cells, hepatocytes, muscle cells, pheochromocytoma cells (PC 12) and other cell types
- Cell cultivation in serum-free or serum-reduced medium

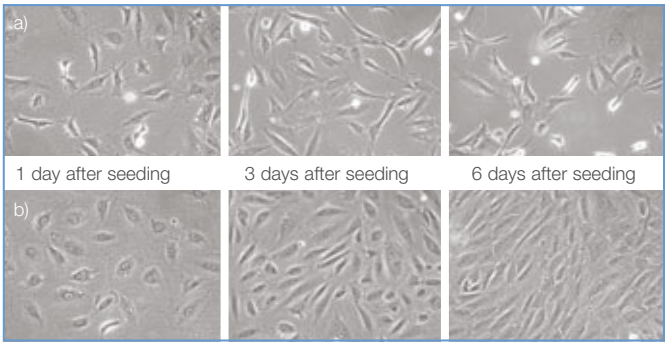


Figure 1: Comparison of the proliferation of human endothelial cells from the umbilical vein (HUVEC) on a) TC-treated surfaces and b) surfaces coated with Collagen Type I

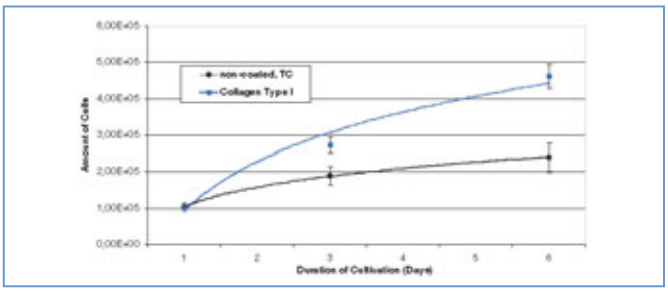
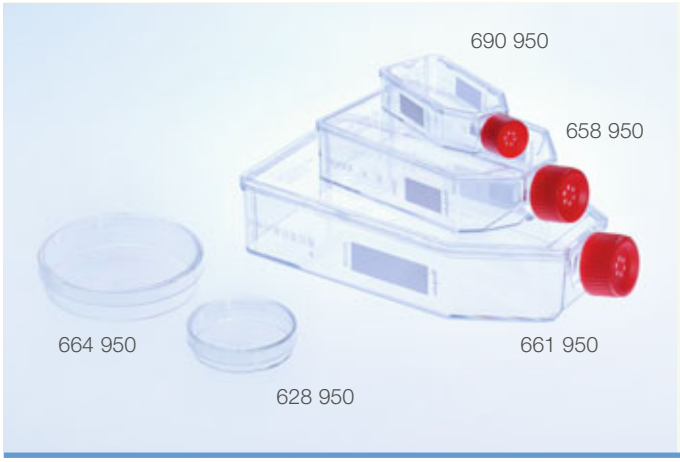


Figure 2: Comparison of the proliferation of human endothelial cells from the umbilical vein (HUVEC) on TC-treated surfaces and surfaces coated with Collagen Type I



Collagen Type I CELLCOAT®

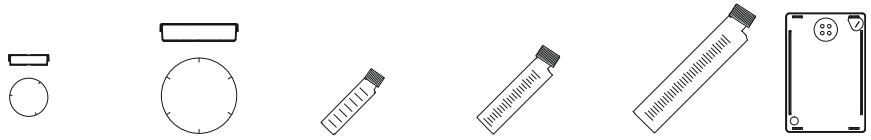
Cell Culture Dishes / Flasks

Cell Culture Vessels p. 16-20

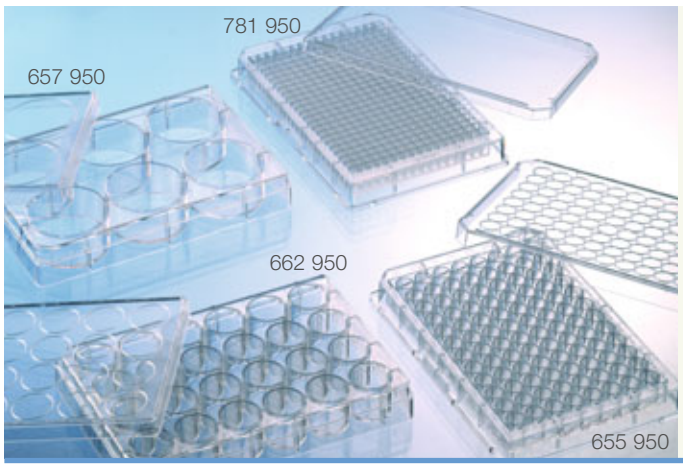
ThinCert™ Cell Culture Inserts coated with Collagen Type I p. 61

Further cell culture vessels coated with Collagen Type I available on request

- Cell culture flasks with filter caps
- Shelf life: 24 months at room temperature



	628 950	664 950	690 950	658 950	661 950	779 959
Description	dish	dish	flask	flask	flask	AutoFlask™
ø [mm] x height [mm]	60 x 15	100 x 20	-	-	-	-
Growth area [cm²]	21	58	25	75	175	83.6
Total volume [ml]	28	100	50	250	650	110
Working volume [ml]	6 – 7	16 – 17	5 – 10	15 – 38	20 – 85	20 – 40
Protein coating	Collagen Type I	Collagen Type I	Collagen Type I	Collagen Type I	Collagen Type I	Collagen Type I
Filter screw cap	-	-	red	red	red	-
Quantity per bag/case	20/100	10/40	10/50	5/50	5/40	10/100



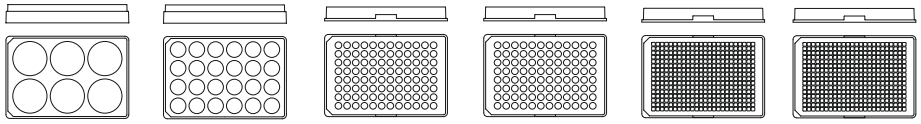
Collagen Type I CELLCOAT®

Cell Culture Multiwell Plates
Cell Culture Microplates

Cell Culture Multiwell Plates p. 22
Cell Culture Microplates p. 24-30

Further cell culture vessels coated with Collagen Type I available on request

- Shelf life: 24 months at room temperature



Cat.-No.	657 950	662 950	655 950	655 956	781 950	781 956
Well format	6 well	24 well	96 well	96 well	384 well	384 well
Bottom	solid	solid	solid	µClear®	solid	µClear®
Colour	clear	clear	clear	black	clear	black
Growth area per well [cm²]	9.6	1.9	0.34	0.34	0.1	0.1
Total volume [ml]	16.1	3.3	0.392	0.392	0.131	0.131
Working volume [ml]	2 – 5	0.5 – 1	0.025 – 0.34	0.025 – 0.34	0.015 – 0.11	0.015 – 0.11
Protein coating	Collagen Type I	Collagen Type I	Collagen Type I	Collagen Type I	Collagen Type I	Collagen Type I
Lid	+*)	+*)	+*)	+*)	+	+
Quantity per bag/case	5/50	5/50	5/20	5/20	5/20	5/20

*) with condensation rings

Poly-Lysine CELLCOAT®

Poly-D-Lysine (PDL) and Poly-L-Lysine (PLL) are synthetic molecules that are used to improve adhesion of different cell types to polystyrene surfaces (Fig. 1). Especially when serum-free or serum-reduced medium is used or when experiments such as transfections are performed, the cultivation efficiency of individual cell lines can be improved. As synthetic molecule Poly-D-Lysine is free of impurities carried by other proteins.

- Reduced-serum or serum-free cultivation
- Cell differentiation and neuron growth
- Promotion of cell adhesion, proliferation and growth of transfected cell lines (e.g. HEK 293, PC 12, L929, certain 3T3 cell lines), neuronal cell lines, as well as primary neurons and glia cells
- Synthetic polypeptides
- Molecular weight PDL: 75 – 150 kDa; PLL: 30 – 70 kDa
- Experiments with automated cell culture
- Experiments with washing steps

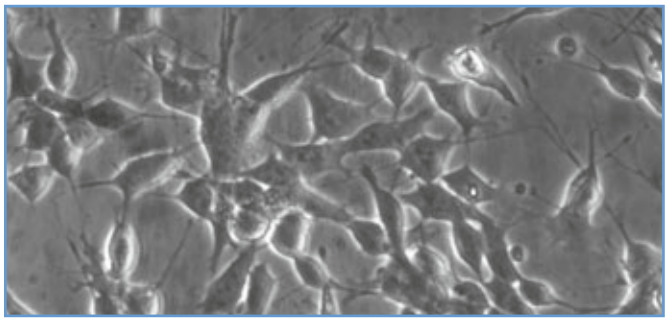
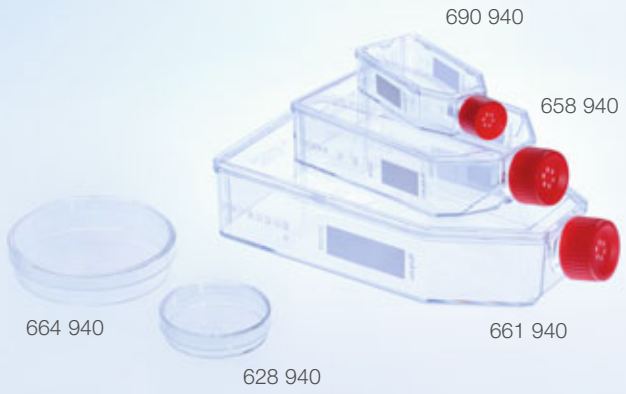


Figure 1: Cells of a neuroblastoma cell line on PDL CELLCOAT®, 24 hours after seeding.



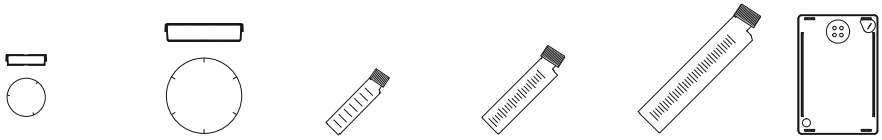
Poly-D-Lysine CELLCOAT®

Cell Culture Dishes / Flasks

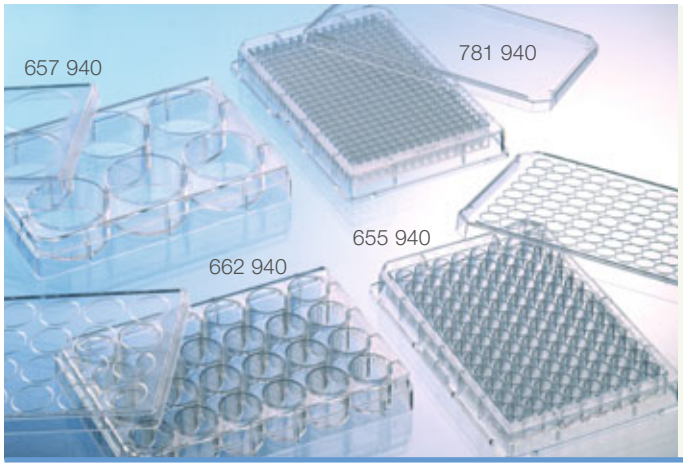
Cell Culture Vessels p. 16-20

Further cell culture vessels coated with Poly-D-Lysine available on request

- Cell culture flasks with filter caps
- Shelf life: 24 months at room temperature



	628 940	664 940	690 940	658 940	661 940	779 946
Description	dish	dish	flask	flask	flask	AutoFlask™
ø [mm] x height [mm]	60 x 15	100 x 20	-	-	-	-
Growth area [cm²]	21	58	25	75	175	83.6
Total volume [ml]	28	100	50	250	650	110
Working volume [ml]	6 – 7	16 – 17	5 – 10	15 – 38	20 – 85	20 – 40
Protein coating	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine
Filter screw cap	-	-	red	red	red	-
Quantity per bag/case	20/100	10/40	10/50	5/50	5/40	10/100



Poly-D-Lysine CELLCOAT®

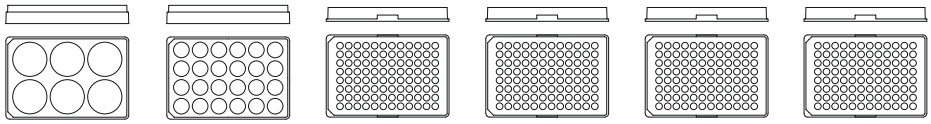
Cell Culture Multiwell Plates
Cell Culture Microplates

Cell Culture Multiwell Plates p. 22

Cell Culture Microplates p. 24-30

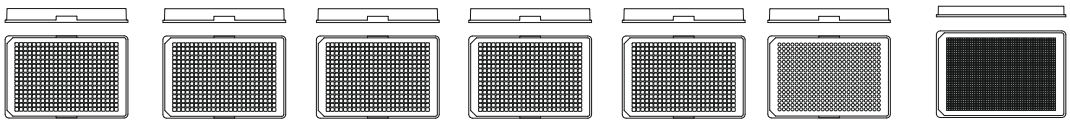
Further cell culture vessels coated with Poly-D-Lysine available on request

- Cat.-No. 655 948 and 781 948 have a user-friendly bulk package
- Shelf life: 24 months (multiwell plates) / 18 months (microplates) at room temperature

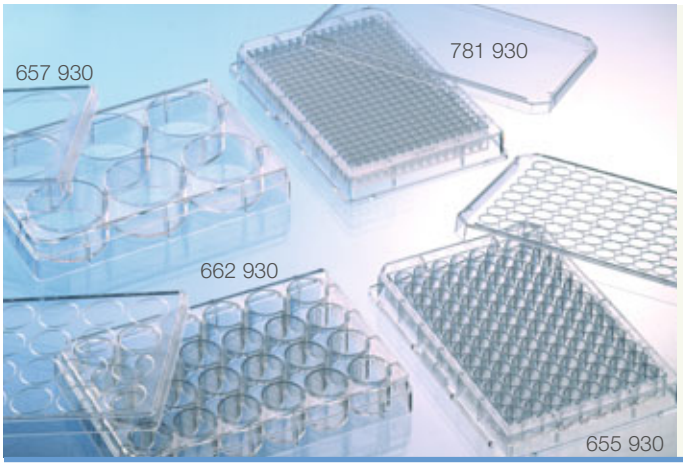


Cat.-No.	657 940	662 940	655 940	655 944	655 946	655 948
Well format	6 well	24 well	96 well	96 well	96 well	96 well
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	µClear®	µClear®	µClear®
Colour	clear	clear	clear	white	black	black
Growth area per well [cm²]	9.6	1.9	0.34	0.34	0.34	0.34
Total volume [ml]	16.1	3.3	0.392	0.392	0.392	0.392
Working volume [ml]	2 – 5	0.5 – 1	0.025 – 0.34	0.025 – 0.34	0.025 – 0.34	0.025 – 0.34
Protein coating	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine
Lid	+*)	+*)	+*)	+*)	+*)	+*)
Quantity per bag/case	5/50	5/50	5/20	5/20	5/20	20/120

*) with condensation rings



Cat.-No.	781 940	781 945	781 944	781 946	781 948	784 946	782 946
Well format	384 well	384 well	384 well	384 well	384 well	384 well	1536 well
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom	Small Volume™	F-bottom
Bottom	solid	solid	µClear®	µClear®	µClear®	solid	µClear®
Colour	clear	white	white	black	black	black	black
Growth area per well [cm²]	0.1	0.1	0.1	0.1	0.1	0.027	0.023
Total volume [ml]	0.131	0.131	0.131	0.131	0.131	0.028	0.013
Working volume [ml]	0.015 – 0.11	0.015 – 0.11	0.015 – 0.11	0.015 – 0.11	0.015 – 0.11	0.004 – 0.025	0.003 – 0.01
Protein coating	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine	Poly-**D**-Lysine
Lid	+	+	+	+	+	+	+
Quantity per bag/case	5/20	5/20	5/20	5/20	20/120	5/20	5/20
Plate Design						HiBase	HiBase



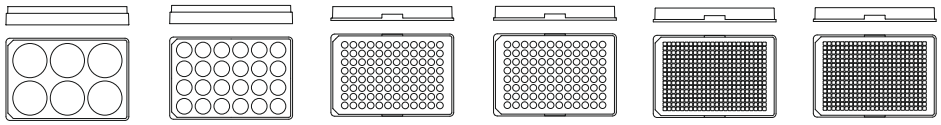
Poly-L-Lysine CELLCOAT®

Cell Culture Dish
Cell Culture Multiwell Plates
Cell Culture Microplates

Cell Culture Multiwell Plates p. 22
Cell Culture Microplates p. 24-30

Further cell culture vessels coated with Poly-L-Lysine available on request

- Shelf life: 24 months (multiwell plates, dish) / 18 months (microplates) at room temperature



Cat.-No.	657 930	662 930	655 930	655 936	781 930	781 936
Well format	6 well	24 well	96 well	96 well	384 well	384 well
Bottom	solid	solid	solid	µClear®	solid	µClear®
Colour	clear	clear	clear	black	clear	black
Growth area per well [cm²]	9.6	1.9	0.34	0.34	0.1	0.1
Total volume [ml]	16.1	3.3	0.392	0.392	0.131	0.131
Working volume [ml]	2 – 5	0.5 – 1	0.025 – 0.34	0.025 – 0.34	0.015 – 0.11	0.015 – 0.11
Protein coating	Poly-**L**-Lysine	Poly-**L**-Lysine	Poly-**L**-Lysine	Poly-**L**-Lysine	Poly-**L**-Lysine	Poly-**L**-Lysine
Lid	+*)	+*)	+*)	+*)	+	+
Quantity per bag/case	5/50	5/50	5/20	5/20	5/20	5/20

*) with condensation rings

Cat.-No.	628 930
Description	dish
ø [mm] x height [mm]	60 x 15
Growth area [cm²]	21
Total volume [ml]	17
Working volume [ml]	6 – 7
Protein coating	Poly-**L**-Lysine
Quantity per bag/case	20/100

Fibronectin CELLCOAT®

Fibronectin is a high molecular weight glycoprotein present in the extracellular matrix (ECM) and plasma. *In vivo* Fibronectin mediates the adhesion of cells to the extracellular matrix via integrin receptors. It is further involved in migration and differentiation of various cells in embryogenesis as well as wound healing.

Coated as a thin layer on the cultivation surface, Fibronectin serves as a substrate to promote adhesion, proliferation and growth of different cell types.

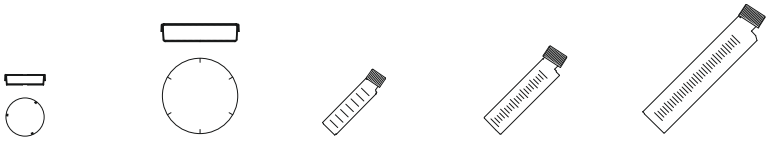
Applications:
- Increase of isolation and cultivation efficiency
- Low-serum or serum-free cultivation
- Cell adhesion studies
- Promotion of cell adhesion, proliferation and growth of endothelial cells, fibroblasts, smooth muscle cells, neurons and epithelial cells

Fibronectin CELLCOAT®
Cell Culture Dishes / Flasks

Cell Culture Vessels p. 16-20

Further cell culture vessels coated with Fibronectin available on request

- Cell culture flasks with filter caps
- Minimum order amount: 60 pieces/cat.-no.
- Shelf life: 6 months at 2 – 8 °C



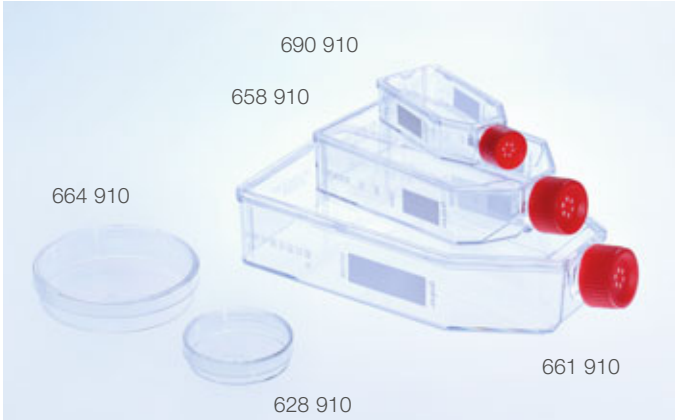
Cat.-No.	628 920	664 920	690 920	658 920	661 920
Description	dish	dish	flask	flask	flask
ø [mm] x height [mm]	60 x 15	100 x 20	-	-	-
Growth area [cm²]	21	58	25	75	175
Total volume [ml]	28	100	50	250	650
Working volume [ml]	6 – 7	16 – 17	5 – 10	15 – 38	20 – 85
Protein coating	Fibronectin	Fibronectin	Fibronectin	Fibronectin	Fibronectin
Filter screw cap	-	-	red	red	red
Quantity per bag/case	5/20	5/10	10	10	5

Laminin CELLCOAT®

Laminin is one of the main components of the basement membrane. It consists of three subunits that provide binding sites for the integrin receptor of the cell membrane as well as other extracellular matrix proteins. *In vitro* Laminin is used as a cultivation substrate for improved adhesion and maintenance of the differentiation status of various cells. Further applications are for cell adhesion studies, chemotaxis assays and to increase isolation and cultivation efficiency.

Applications:

- Increase of isolation and cultivation efficiency
- Introduction of cell differentiation and neurite outgrowth
- Cell adhesion studies
- Chemotaxis studies
- Promotion of cell adhesion; proliferation of various cell types such as endothelial, epithelial, muscle and neuronal cells



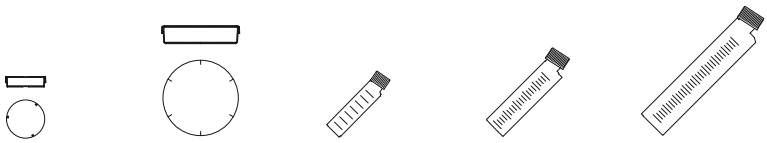
Laminin CELLCOAT®

Cell Culture Dishes / Flasks

Cell Culture Vessels p. 16-20

Further cell culture vessels coated with Laminin available on request

- Cell culture flasks with filter caps
- Minimum order amount: 60 pieces/cat.-no.
- Shelf life: 6 months at 2 – 8 °C



Cat.-No.	628 910	664 910	690 910	658 910	661 910
Description	dish	dish	flask	flask	flask
ø [mm] x height [mm]	60 x 15	100 x 20	-	-	-
Growth area [cm²]	21	58	25	75	175
Total volume [ml]	28	100	50	250	650
Working volume [ml]	6 – 7	16 – 17	5 – 10	15 – 38	20 – 85
Protein coating	Laminin	Laminin	Laminin	Laminin	Laminin
Filter screw cap	-	-	red	red	red
Quantity per bag/case	5/20	5/10	10	10	5

CELLSTAR® Cell Culture Vessels with Cell-Repellent Surface

In contrast to standard tissue culture surfaces which are optimised to enhance conditions for cell attachment, the cell-repellent surface has been developed to effectively prevent cell attachment.

CELLSTAR® cell culture vessels with a cell-repellent surface reliably prevent cell attachment in suspension cultures of semi-adherent and adherent cell lines where standard hydrophobic surfaces generally used for suspension culture are insufficient (Fig. 1).

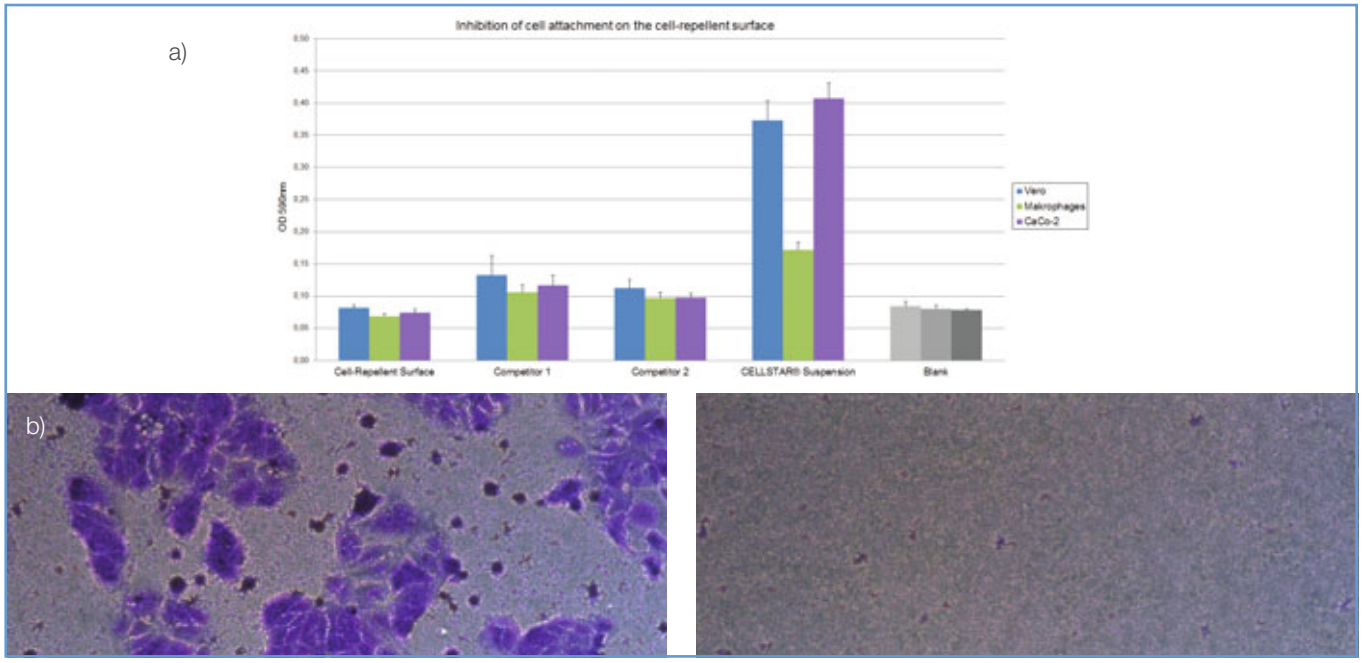


Figure 1: The cell-repellent surface effectively inhibits cell attachment.
a) Spectroscopic analysis of cell attachment of Vero, CaCo-2 cells and macrophages. Cells were seeded in F-bottom 96 well microplates, incubated at 37 °C and 5 % CO_2 for 24 hours. The media was discarded prior to analysis of cell attachment by crystal violet staining. After dissolving the crystal violet dye in the cells attached to the well surface, optical density was measured at 590 nm.
b) Microscopic analysis of CaCo-2 cells with 10 x magnification following crystal violet staining (left: CELLSTAR® suspension; right: cell-repellent surface).

For formation of spheroids (Fig. 2a), self-assembled spherical clusters used as 3-D cell culture models, the cell-cell interaction must dominate over the interaction between the cells and the culture surface of containment. The same principle is true for the formation of stem cell aggregates (Fig. 2b), a key step within many protocols for cultivation and differentiation of stem cells. Cell culture vessels equipped with the Greiner Bio-One cell-repellent surface present an ideal platform for cultivating both spheroids and stem cell aggregates. Long-term incubations of hydrogel cultures are frequently performed as an approach to mimic a 3-D environment. When standard tissue culture vessels are used in this approach, some cells tend to migrate out of the hydrogel, forming a 2-D subculture on the vessel surface.
Analysis of such a cell population will therefore result in mixed data from both 2-D and 3-D cell cultures. CELLSTAR® cell culture vessels with a cell-repellent surface may be used for hydrogel cultures to effectively suppress the formation of 2-D subcultures.

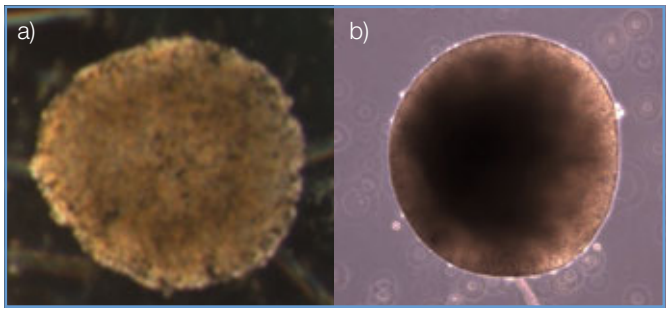
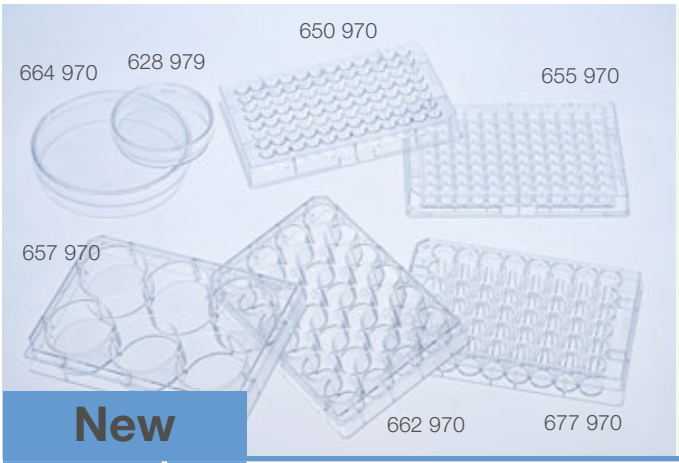


Figure 2:
a) LNCaP cells form single spheroids in 96 well U-bottom microplates with cell-repellent surface. 3,000 cells were seeded per well and incubated at 37 °C and 5 % CO_2 over a 7 day period.
b) Aggregate formation of human induced pluripotent stem cells (iPSCs) cultured in a 96 well U-bottom microplate with cell-repellent surface.

Applications:
- Spheroid culture of tumour cells
- Aggregation of stem cells
- Suspension culture of semi-adherent and adherent cell lines
- 3D-culture in hydrogels

Further information on CELLSTAR® cell-repellent surface

→ **Forum No. 17: CELLSTAR® Cell Culture Vessels with Cell-Repellent Surface** (F073 777)
→ **Application Report "Advantage of CELLSTAR® Cell Culture Vessels with Cell-Repellent Surface for 3-D Cell Culture in Hydrogels"** (F073 792)



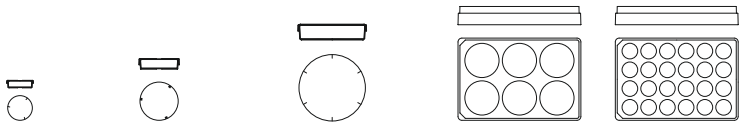
New

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic

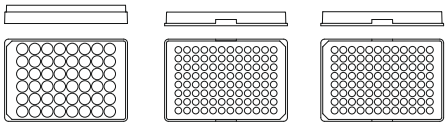
Cell Culture Vessels with Cell-Repellent Surface

Further cell culture vessels with cell-repellent surface are available on request.



Cat.-No.	627 979	628 979	664 970	657 970	662 970
Description	dish	dish	dish	6 well	24 well
ø [mm] x height [mm]	35 x 10	60 x 15	100 x 20	-	-
Well profile	-	-	-	F-bottom	F-bottom
Bottom	solid	solid	solid	solid	solid
Colour	clear	clear	clear	clear	clear
Total volume [ml]	10	28	100	16.1	3.3
Working volume [ml]	5	6 – 7	16 – 17	2 – 5	0.5 – 1.5
Surface treatment	cell-repellent	cell-repellent	cell-repellent	cell-repellent	cell-repellent
Sterile	+	+	+	+	+
Lid	+	+	+	+*)	+*)
Quantity per bag/case	10/40	10/20	1/5	1/5	1/5

*) with condensation rings



Cat.-No.	677 970	650 970	655 970
Description	48 well	96 well	96 well
Well profile	F-bottom	U-bottom	F-bottom/ chimney well
Bottom	solid	solid	solid
Colour	clear	clear	clear
Total volume [ml]	1.7	0.323	0.392
Working volume [ml]	0.5 – 1	0.04 – 0.28	0.025 – 0.34
Surface treatment	cell-repellent	cell-repellent	cell-repellent
Sterile	+	+	+
Lid	+*)	+*)	+*)
Quantity per bag/case	1/5	1/6	1/6

*) with condensation rings

Cell Culture Products for Microscopy

CELLview™ Dish – Cell Culture Dish with Glass Bottom

The CELLview™ cell culture dish combines the convenience of a standard size 35 mm disposable plastic cell culture dish with the optical quality of glass, providing superior high-resolution microscopic images of in-vitro cultivated cultures.

It is made from high-grade polystyrene combined with an integrated glass bottom. The innovative design of the cell culture dish provides a single-plane, flat bottom with a consistent working distance and maximal planarity. Moreover, the dish bottom configuration facilitates optimal thermal conductivity and avoids thermal variations in heated platforms used for live cell imaging.

The subdivided version of the CELLview™ Dish enables simultaneous multiplex analyses of different cell lines, various stimulations or diverse transfections. Quartering the cell culture dish provides four individual compartments with a growth area of approximately 1.9 cm^2, allowing minimisation of cells and reagents required per individual assay.

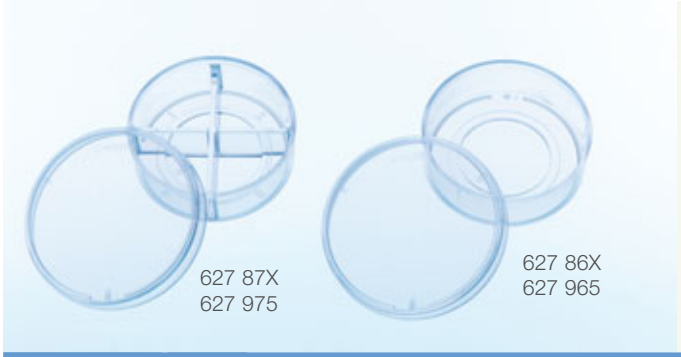
In addition to the untreated glass surface, Greiner Bio-One provides a **tissue culture surface treatment** as well as the innovative **Advanced TC™ surface modification** (→ p. 38) to enhance the attachment of adherent cells, thus eliminating the need for protein coating in many cases.
The high optical quality of the glass coverslip assures accurate planarity and inhibits any depolarisation of light.

Glass bottom features:
- High transparent achromatic borosilicate glass; hydrolytic class 1 (DIN ISO 719)
- Glass thickness 175 µm +/- 15 µm
- Maximal spectral transmission; no autofluorescence
- Exceptional planarity
- Manufactured according to ISO 8255-1:1986 (Optics and optical instruments – Microscopes – Cover glasses)

!

Further information on CELLview™ Dish

→ **Application Note "Protein localisation using confocal laser scanning microscopy"** (F073 101)
→ **Application Note "Live cell imaging on Golgi morpholgy using the CELLview™ dish"** (F074 048)

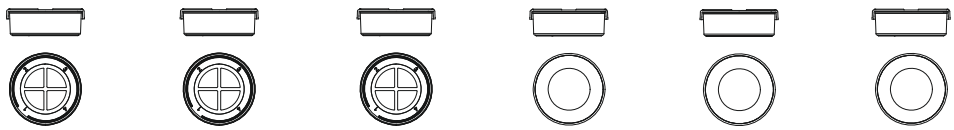


CELLview™ Dish

Advantages:
- Subdivided version enables simultaneous multiplex analysis
- Embedded glass bottom for maximal planarity
- Additional TC surface treatment and Advanced TC™ surface modification available

Applications:
- Phase contrast microscopy
- Fluorescence microscopy
- Confocal microscopy
- Live cell imaging
- Differential interference contrast microscopy
- Polarised light microscopy
- Fluorescence-in-situ-hybridisation (FISH)

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	627 870	627 975	627 871	627 860	627 965	627 861
Description	CELLview™ cell culture dish	CELLview™ cell culture dish	CELLview™ cell culture dish	CELLview™ cell culture dish	CELLview™ cell culture dish	CELLview™ cell culture dish
Bottom	glass	glass	glass	glass	glass	glass
No. of compartments	4	4	4	1	1	1
ø [mm] x height [mm]	35 x 10	35 x 10	35 x 10	35 x 10	35 x 10	35 x 10
Growth area [cm^2]	1.9/compartment	1.9/compartment	1.9/compartment	8.7	8.7	8.7
Total volume [ml]	1.5/compartment	1.5/compartment	1.5/compartment	10	10	10
Working volume [ml]	0.1/0.5*)	0.1/0.5*)	0.1/0.5*)	5	5	5
Surface treatment	TC	Advanced TC™	-	TC	Advanced TC™	-
Sterile	+	+	+	+	+	+
Quantity per bag/case	10/40	10/40	10/40	10/40	10/40	10/40

*) 0.1 ml for seeding or staining only on glass area; 0.5 ml for cultivation in the complete compartment

CELLview™ Slide – Microscopic Slide with Glass Bottom

CELLview™ Slide consists of a transparent slide with a black upper housing that provides 10 wells within which individual experiments can be performed. The slide has a 175 µm thick cover glass embedded in its bottom for improved optical clarity and imaging. The housing effectively subdivides the slide into 10 compartments, which have been designed to mimic the size and layout of a standard 96 well microplate. Because of this standard layout, the slide is compatible with multi-channel pipettes, making it simple and efficient to use. Furthermore, the round well design helps to reduce meniscus effects for optimum results in cell culture and microscopic analysis.

CELLview™ Slide is suitable for all applications that require cell culture with subsequent cell stimulation and/or immunocytochemical and microscopic analysis. The embedded cover glass of CELLview™ slide guarantees an even focal plane which is a prerequisite for all high-speed and high-resolution microscopy applications. Furthermore, the black upper housing reduces cross talk between adjacent wells during fluorescence microscopy and the optical glass, which exhibits virtually no autofluorescence, allows for maximum spectral transmission without depolarisation of transmitted light.

CELLview™ Slide has been developed to meet the requirements of state-of-the-art microscopic analyses such as:

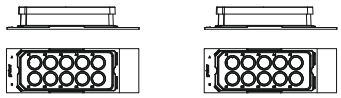
- Phase Contrast Microscopy
- Fluorescence Microscopy
- Confocal Microscopy (CLSM/LSCM)
- Video-Enhanced Microscopy
- Live Cell Imaging
- High Resolution Microscopy
- Differential Interference Contrast Microscopy
- Polarised Light Microscopy
- Time Lapsed Microscopy
- Fluorescence-In-Situ-Hybridisation (FISH)

New

non-cytotoxic

CELLview™ Slide

- 10 wells with alphanumeric coding
- Positioning notch for automated microscopy
- Detachable black upper housing
- Reduced meniscus effect due to round well design
- Well distance is equal to a 96 well microplate
- Highly transparent achromatic borosilicate glass, hydrolytic class 1
- Glass thickness: 175 µm ± 15 µm



Cat.-No.	543 079	543 979
Description	CELLview™ Slide	CELLview™ Slide
Bottom	glass	glass
No. of wells	10	10
Length x width x height [mm]	75 x 25 x 12.6	75 x 25 x 12.6
Growth area [mm²]	32/well	32/well
Total volume [µl]	447/well	447/well
Surface treatment	TC	Advanced TC™
Sterile	+	+
Quantity per bag/case	5/45	5/45

SCREENSTAR Microplates

SCREENSTAR microplates:
- Are specialised products for sophisticated microscopic applications, in high content screening (HCS) or high resolution microscopy with water and oil immersion objectives
- Combine outstanding glass-like optical properties with an excellent surface for adherent cell culture
- Display excellent optical properties with reduced autofluorescence in the lower UV range, low birefringence and a refractive index of 1.53 comparable to glass.
- Enable complete periphery access for high magnification objectives (Fig. 1)
- Are entirely manufactured out of cycloolefin with a black pigmented cycloolefin frame and a 190 µm ultraclear cycloolefin film bottom
- Are available in 96, 384 and 1536 well format

Greiner Bio-One developed SCREENSTAR microplates as a product line especially suited for advanced microscopy:
- with water or oil immersion objectives
- with high magnification objectives (40 x and above)
- with high resolution (high numerical aperture) objectives

Figure 1: SCREENSTAR recessed microplate wells enable complete periphery access for high magnification objectives.
40 x water immersion objective for microscopic detection in a 96 well SCREENSTAR microplate. The SCREENSTAR microplate recessed well bottom allows a close proximity for the objectives to fully access all microplate wells.

96 Well SCREENSTAR Microplate

- Proven cell culture surface treatment guarantees reliable and homogenous cell growth
- Superior optical, highly transparent cycloolefin film bottom with low background
- Recessed microplate bottom allows low working distance and high aperture (Fig. 1)
- Round well geometry (Fig. 2) to reduce optical distortions
- Ditch at the perimeter can be filled with fluids to minimise edge effects and evaporation (Fig. 3)
- Working volume up to 440 µl for prolonged cell culture
- Protective film on optical bottom to diminish airborne contamination and surface defects
- Individually wrapped plate with lid and easy-to-open packaging

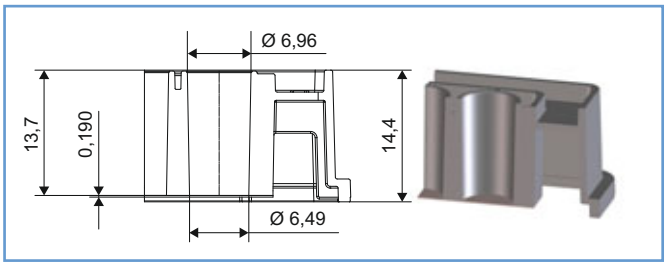


Figure 2: Well design of a 96 well SCREENSTAR microplate

Plate height:	14.4 mm
Well depth:	13.7 mm
Well diameter top:	6.96 mm
Well diameter bottom:	6.49 mm
Distance microplate rim to internal well bottom:	0.7 mm
Distance microplate rim to external well bottom:	0.51 mm
Film bottom thickness:	190 µm
Total volume:	483 µl
Working volume:	25 – 440 µl
Growth area:	33 mm²

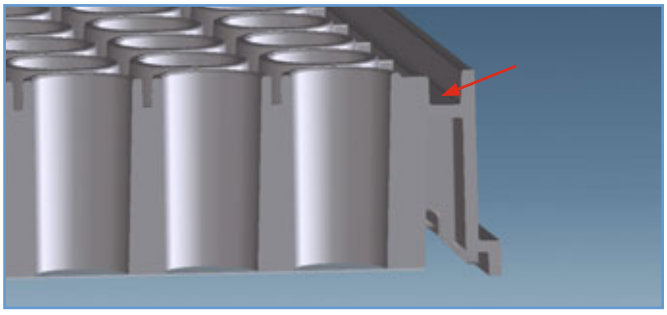


Figure 3: Detail of the 96 well SCREENSTAR microplate demonstrating the perimeter ditch which can be filled with sterile water or media

384 Well SCREENSTAR Microplate

- For high content screening in drug discovery
- Proven Greiner Bio-One cell culture quality
- Superior optical, highly transparent cycloolefin film bottom with low background
- Recessed film bottom for high magnification and improved resolution
- Smooth microplate top absent of alphanumeric coding facilitates flush lid mounting for use within automated systems and improves heat sealing

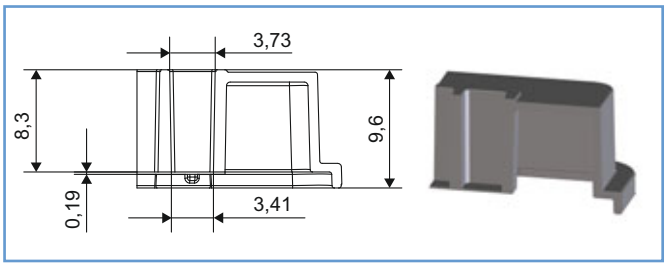


Figure 4: Well design of a 384 well SCREENSTAR microplate

Plate height:	9.6 mm
Well depth:	8.3 mm
Well diameter top:	3.73 mm
Well diameter bottom:	3.41 mm
Distance microplate rim to internal well bottom:	1.3 mm
Distance mictoplate rim to external well bottom:	1.11 mm
Film bottom thickness:	190 µm
Total volume:	104 µl
Working volume:	10 – 95 µl
Growth area:	12 mm²

1536 Well SCREENSTAR Microplate

- For high throughput and high content screening applications
- Proven Greiner Bio-One cell culture quality
- Smooth microplate top absent of alphanumeric coding facilitates flush lid mounting for use within automated systems and improves heat sealing
- Microplates are shrink-wrapped in recyclable PET bags with a bottom tray enclosure for added protection of the film bottom
- Recommended lid: Cat.-No. 691 161 (sterile ultra low profile lid → p. 204)

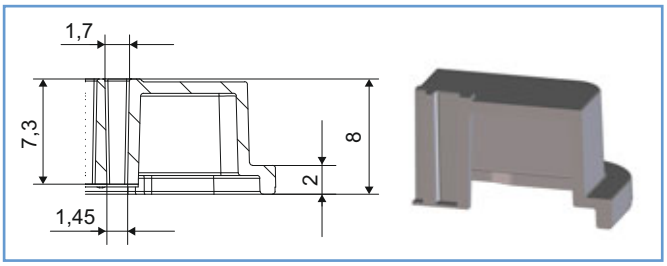


Figure 5: Well design of a 1536 well SCREENSTAR microplate

Plate height:	8 mm
Well depth:	7.3 mm
Well diameter top:	1.7 mm
Well diameter bottom:	1.45 mm
Distance microplate rim to internal well bottom:	0.7 mm
Distance microplate rim to external well bottom:	0.51 mm
Film bottom thickness:	190 µm
Total volume:	18 µl
Working volume:	3 – 15 µl
Growth area:	2.1 mm²

Further information on SCREENSTAR microplates

→ **Forum No. 15: SCREENSTAR. A new 1536 Well Microplate for High Content and High Throughput Screening** (F073 120)

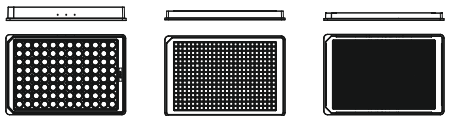
→ **Forum No. 18: SCREENSTAR and SensoPlate™ Plus: Microplates for Advanced Microscopy** (F073 787)

96, 384, 1536 Well SCREENSTAR Microplates

- SensoPlate™ / SensoPlate™ Plus Microplates p. 99
- Barcode Labelling p. 220

- Non-sterile, non-treated versions available on request

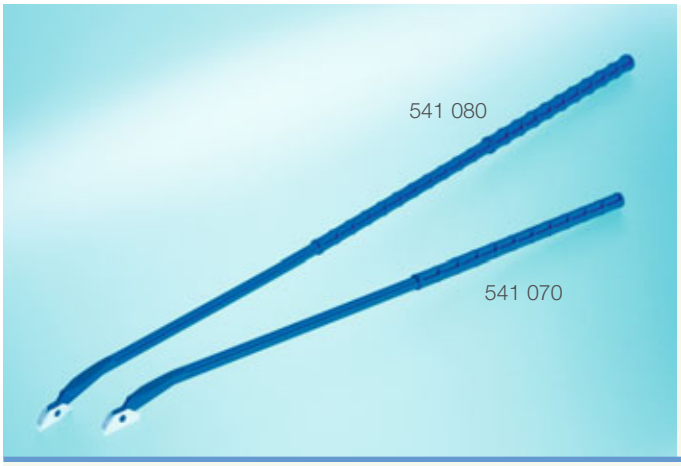
non-cytotoxic



Cat.-No.	655 866	789 836	789 866
Well format	96 well	384 well	1536 well
Well profile	F-bottom/ chimney well	F-bottom	F-bottom
Bottom	CO film	CO film	CO film
Colour	black	black	black
Growth area per well [mm²]	33	12	2.1
Total volume [µl]	483	104	18
Working volume per well [µl]	25 – 440	10 – 95	3 – 15
TC surface treatment	+	+	+
Sterile	+	+	+
Lid	+	+*)	-
Quantity per bag/case	1/16	10/40	17/68
		New	New

*) ultra low profile lid

Accessories



Cell Scrapers

- For gentle mechanical removal of adherent cells
- Optimised blade design for maximum cell harvest
- Blade length: 1.8 cm
- Minimal mechanical strain
- 28 cm and 40 cm handhold length
- Pivot angle 60°
- Sterile individual packaging

Optimised scraper design
The optimised design of the scraper blade features a pivot angle of 60° that facilitates uniform contact with the growth surface, minimal mechanical strain and efficient cell harvest, even from poorly accessible surfaces. The scraper design also minimises any accumulation of cell suspension to the blade structure. The handle length has been adapted for use with all commercially available cell culture flasks. Cell scrapers from Greiner Bio-One are available in two handle sizes: 28 cm for cell culture flask harvest and 40 cm for removal of cells in larger cell culture devices such as roller bottles. Both cell scrapers are provided sterile and individually packed.

User-friendly packaging
The user-friendly packaging can be opened either by peeling off (Fig. 1a) or tearing (Fig. 1b) the plastic bag. Lot number and expiry date are embossed on each bag.

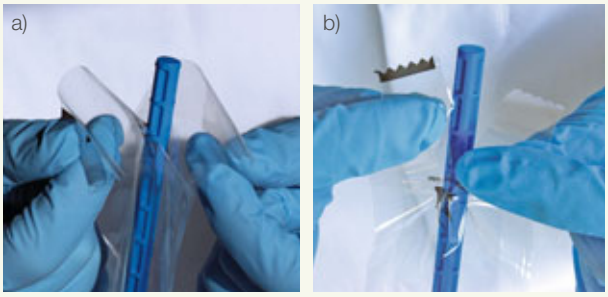


Figure 1: User-friendly packaging

Cat.-No.	541 070	541 080
Length [cm]	28	40
Sterile	+	+
Quantity per bag/case	1/100	1/100

ThinCert™

6, 12 and 24 Well Cell Culture Inserts for Multiwell Plates

For advanced cell and tissue culture applications, Greiner Bio-One offers an extensive family of membrane supports – ThinCert™. Combining 6 different membrane specifications (pore size and density) in geometries to fit 6, 12 and 24 well plates, the ThinCert™ cell culture inserts are suitable for a wide range of applications including transport, secretion and diffusion studies, migrational experiments, cytotoxicity testing, co-cultures, trans epithelial electric resistance (TEER) measurements, as well as primary cell culture.
ThinCert™ cell culture inserts are compatible with standard CELLSTAR® multiwell plates from Greiner Bio-One, and are pre-packed together with the requisite number of plates. The automated production process includes double optical control of each insert produced, ensuring that any biological contamination is avoided. The sterility of the single blister-packed inserts and multiwell plates is ensured by irradiation.

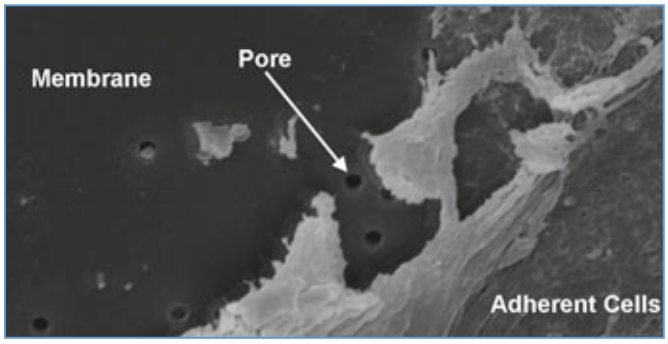


Figure 1: Electron micrograph of human osteosarcoma cells on ThinCert™ membrane. Courtesy of the Department of Oral and Maxillar Facial Surgery, University Hospital Freiburg.

ThinCert™ cell culture inserts are produced from high-grade clear polystyrene housings, and polyethylene terephthalate (PET) capillary pore membranes. Both materials, polystyrene and PET, are USP class VI certified and cell culture compatible. The coupling between the housing and the membrane is achieved using an automated process which produces an extremely strong and robust seal without compromising or weakening the membrane in any way. The membranes undergo a physical surface treatment to optimise cellular adherence and growth characteristics. All the capillary pores in a membrane exhibit a high degree of uniformity in diameter. This uniformity ensures reliable and consistent exchange rates between the two compartments and thus provides reproducibility when conducting multiple experiments.

For light or electron microscopy applications, the membranes can be easily detached from the housing using a scalpel, and once detached, the membrane stays flat and does not curl up, simplifying further manual working steps and avoiding loss of cells. Due to a high chemical resistance to solvents (→ p. 228) a broad spectrum of cell fixation protocols can be performed.

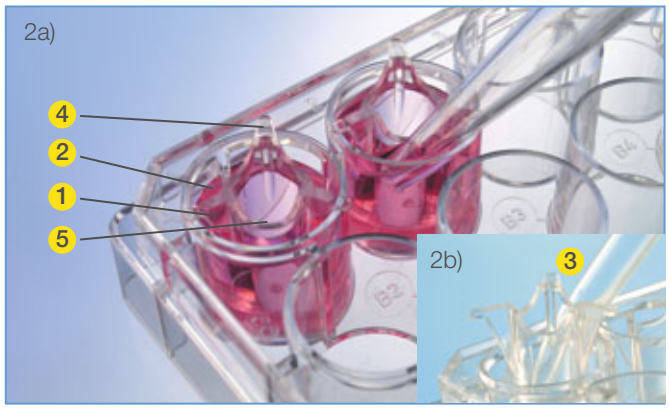


Figure 2a: ThinCert™ cell culture inserts
Figure 2b: "Self-lift" geometry of ThinCert™ cell culture inserts

Figure 3: ThinCert™ cell culture inserts packaging

The specific hanging geometry design of the ThinCert™ cell culture inserts ensures that there is always a gap between the membrane support and the bottom of the well. This avoids damage to the cells growing in the lower compartment.
In addition the spacers (Fig. 2a → 1) prevent capillary suction between the side of the well and the ThinCert™ housing. Consequently component exchange between compartments can only take place through the membrane pores. The ThinCert™ cell culture inserts sit in an eccentric position within the well (Fig. 2a → 2). This specific design gives rise to the so called "self-lift" function, with the insert sliding easily upwards when the pipette is inserted into the lower compartment and gliding back into its original position after the pipette has been withdrawn (Fig. 2b → 3). The largest of three pipetting openings is located opposite of the small conical foot (Fig. 2a → 4). This allows for very convenient pipetting of media or supplements even with the ThinCert™ remaining in the well.

The scalloped rims (Fig. 2a → 5) of the ThinCert™ cell culture inserts allow for flatter pipetting angles. This helps to minimise the risk of contamination as the hand of the user does not remain above the open cell culture. Additionally, the scallops significantly enhance the freedom of movement when pipetting and enhance gas exchange during cultivation.

The sales carton can be used as a donator box (Fig. 3). The required number of ThinCert™ cell culture inserts and CELLSTAR® cell culture plates may conveniently be removed from the donator box, whereas the remaining parts may safely be stored in it.

Which Membrane to use?

- Small pore sizes (0.4 and 1 µm in diameter) for co-cultivation as well as for transportation, secretion, and diffusion studies
- Larger pore sizes (3 and 8 µm in diameter) for migration and invasion studies
- Transparent membranes (in general low pore density) suitable for light and electron microscopy; not suited for all applications requiring high diffusion rates such as transport studies
- Translucent membranes (in general high pore density) suitable for electron microscopy, fluorescence microscopy, confocal microscopy, TEER and transport studies

!

Further information on ThinCert™

→ **Forum No. 8**: **ThinCert™ cell culture products – Overview** (F073 017)
→ **ThinCert™ Migration Assay** (F073 115)
→ **ThinCert™ Invasion Assay** (F073 114)
→ **Application Note "Immunocytochemistry"** (F073 100)
→ **Application Note "Skin models"** (F074 062)
→ **Application Note "Co-culture"** (F074 059)
→ **Application Note "TEER and impedance measurements"** (F073 037)

ThinCert™ Cell Culture Inserts 6 Well, 12 Well

Cell Culture Multiwell Plates p. 22

Pre-configured Multiwell Plates with ThinCert™ Cell Culture Inserts available on request

Features

- Stable clear polystyrene housing
- Hanging geometry
- Sealed PET capillary pore membrane
- Single, sterile blister packing
- Improved cell adhesion through physical surface treatment
- Simplified pipetting due to self-lift geometry
- Enhanced pipetting access and gas exchange

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic

6 well							
	Cat.-No.	**657 640**	**657 641**	**657 610**	**657 630**	**657 631**	**657 638**
	Pore size [µm]	0.4	0.4	1.0	3.0	3.0	8.0
	Pore density [cm^{-2}]	1 x 10^8	2 x 10^6	2 x 10^6	0.6 x 10^6	2 x 10^6	0.15 x 10^6
	Optical membrane properties	translucent	transparent	transparent	transparent	translucent	translucent
	Culture surface [mm^2]	452.4	452.4	452.4	452.4	452.4	452.4
	Height (overall) [mm]	16.25	16.25	16.25	16.25	16.25	16.25
	Inner/Outer diameter (top) [mm]	24.85/27.85	24.85/27.85	24.85/27.85	24.85/27.85	24.85/27.85	24.85/27.85
	Working volume ThinCert™ [ml]	1.0 – 3.6	1.0 – 3.6	1.0 – 3.6	1.0 – 3.6	1.0 – 3.6	1.0 – 3.6
	Working volume well [ml]	2.0 – 4.15	2.0 – 4.15	2.0 – 4.15	2.0 – 4.15	2.0 – 4.15	2.0 – 4.15
	TC surface treatment/Sterile	+/+	+/+	+/+	+/+	+/+	+/+
	Multiwell plates/box	4	4	4	4	4	4
	ThinCert™ inserts/box	24	24	24	24	24	24

12 well							
	Cat.-No.	**665 640**	**665 641**	**665 610**	**665 630**	**665 631**	**665 638**
	Pore size [µm]	0.4	0.4	1.0	3.0	3.0	8.0
	Pore density [cm^{-2}]	1 x 10^8	2 x 10^6	2 x 10^6	0.6 x 10^6	2 x 10^6	0.15 x 10^6
	Optical membrane properties	translucent	transparent	transparent	transparent	translucent	translucent
	Culture surface [mm^2]	113.1	113.1	113.1	113.1	113.1	113.1
	Height (overall) [mm]	16.25	16.25	16.25	16.25	16.25	16.25
	Inner/Outer diameter (top) [mm]	13.85/15.85	13.85/15.85	13.85/15.85	13.85/15.85	13.85/15.85	13.85/15.85
	Working volume ThinCert™ [ml]	0.3 – 1.0	0.3 – 1.0	0.3 – 1.0	0.3 – 1.0	0.3 – 1.0	0.3 – 1.0
	Working volume well [ml]	1.0 – 2.0	1.0 – 2.0	1.0 – 2.0	1.0 – 2.0	1.0 – 2.0	1.0 – 2.0
	TC surface treatment/Sterile	+/+	+/+	+/+	+/+	+/+	+/+
	Multiwell plates/box	4	4	4	4	4	4
	ThinCert™ inserts/box	48	48	48	48	48	48

ThinCert™ Cell Culture Inserts 24 Well

Cell Culture Multiwell Plates p. 22

Pre-configured Multiwell Plates with ThinCert™ Cell Culture Inserts available on request

Features

- Stable clear polystyrene housing
- Hanging geometry
- Sealed PET capillary pore membrane
- Single, sterile blister packing
- Improved cell adhesion through physical surface treatment
- Simplified pipetting due to self-lift geometry
- Enhanced pipetting access and gas exchange

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic

24 well	Cat.-No.	662 640	662 641	662 610	662 630	662 631	662 638
	Pore size [µm]	0.4	0.4	1.0	3.0	3.0	8.0
	Pore density [cm^{-2}]	1 x 10^8	2 x 10^6	2 x 10^6	0.6 x 10^6	2 x 10^6	0.15 x 10^6
	Optical membrane properties	translucent	transparent	transparent	transparent	translucent	translucent
	Culture surface [mm^2]	33.6	33.6	33.6	33.6	33.6	33.6
	Height (overall) [mm]	16.25	16.25	16.25	16.25	16.25	16.25
	Inner/Outer diameter (top) [mm]	8.4/10.4	8.4/10.4	8.4/10.4	8.4/10.4	8.4/10.4	8.4/10.4
	Working volume ThinCert™ [ml]	0.1 – 0.35	0.1 – 0.35	0.1 – 0.35	0.1 – 0.35	0.1 – 0.35	0.1 – 0.35
	Working volume well [ml]	0.4 – 1.2	0.4 – 1.2	0.4 – 1.2	0.4 – 1.2	0.4 – 1.2	0.4 – 1.2
	TC surface treatment/Sterile	+/+	+/+	+/+	+/+	+/+	+/+
	Multiwell plates/box	2	2	2	2	2	2
	ThinCert™ inserts/box	48	48	48	48	48	48

ThinCert™ Cell Culture Inserts coated with Collagen Type I

Greiner Bio-One features ThinCert™ cell culture inserts coated with Collagen Type I. The applied industrial coating process ensures a maximum coating quality with minimum batch-to-batch variation. Collagen Type I coated ThinCert™ cell culture inserts are ideal for enhanced cell growth and differentiation within a multitude of organotypic culture applications, such as the reconstruction of functional epithelia for transport studies.

!

Further information on pre-coated ThinCert™ Cell Culture Inserts:

→ **Application Note: "Protein coatings facilitate the differentiation of reconstructed epithelia in ThinCert™ cell culture inserts"** (F073 921)

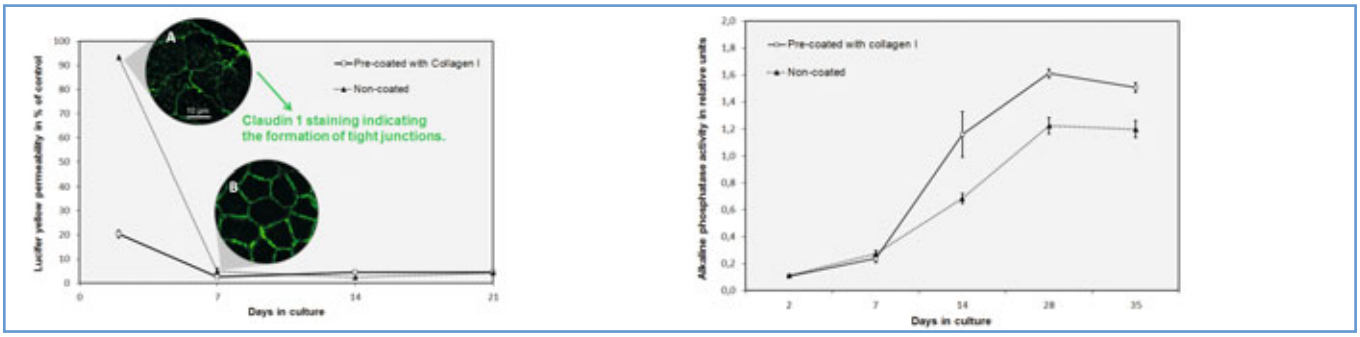


Figure 1: Barrier formation and differentiation of CaCo-2 cells cultivated on Collagen Type I coated ThinCert™ cell culture inserts and non-coated control inserts

New

Free of detectable DNase, RNase, human DNA

non-pyrogenic

non-cytotoxic

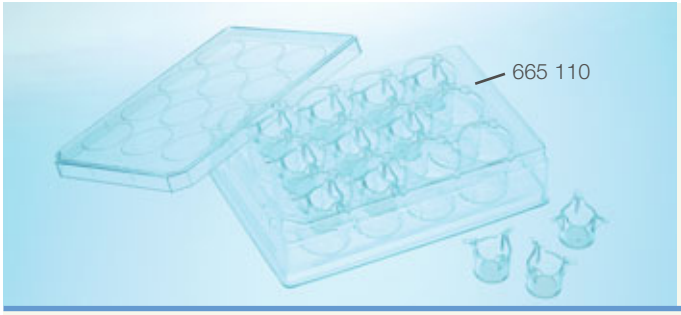
ThinCert™ Cell Culture Inserts coated with Collagen Type I

→ **Cell Culture Multiwell Plates p. 22**

- Available in 6 and 24 well format
- PET capillary pore membrane
- Native Collagen Type I from rat tail

Cat.-No.	657 654	662 654-06	662 654
Description	ThinCert™	ThinCert™	ThinCert™
Size	6 well	24 well	24 well
Pore size [µm]	0.4	0.4	0.4
Pore density [cm²]	1 x 10^8	1 x 10^8	1 x 10^8
Optical membrane properties	translucent	translucent	translucent
Culture surface [mm²]	452.4	33.6	33.6
Height (overall) [mm]	16.25	16.25	16.25
Inner/Outer diameter (top) [mm]	24.85/27.85	8.4/10.4	8.4/10.4
Working volume ThinCert™ [ml]	1.0 – 3.6	0.1 – 0.35	0.1 – 0.35
Working volume well [ml]	2.0 – 4.15	0.4 – 1.2	0.4 – 1.2
Protein coating	Collagen Type I	Collagen Type I	Collagen Type I
Sterile	as	as	as
Multiwell plates/bag	1 x 6 well	1 x 24 well	1 x 24 well
ThinCert™ inserts/plate	6	6	24

ThinCert™Plate



ThinCert™Plate

Cell Culture Multiwell Plates p. 22

- Optimised for use with ThinCert™ cell culture inserts
- Deep wells for an increased volume of medium in air-lift culture
- Notches for fixed insert position
- Available in 6 and 12 well format

ThinCert™Plate

The in-vitro reconstruction of many types of epithelia, such as skin, cornea and airway epithelium, requires that the cells used differentiate at the air-liquid-interphase (air-lift culture). Therefore, the tissue is cultivated in permeable membrane supports (cell culture inserts), with the cell culture medium nourishing the cells from below the membrane and the air exerting its influence from above (Fig. 1b). If cell culture inserts and conventional cell culture plates are utilised in the air-lift culture, the available volume of culture medium is severely limited (Fig. 1b). This reduced volume results in an elevated nutrient consumption rate from the lower compartment and an increased number of medium exchanges. With the ThinCert™Plate, Greiner Bio-One offers an innovative solution for the air-lift culture with ThinCert™ cell culture inserts. The plate is available in 6 and 12 well format. Its deep wells allow a larger volume of medium to be available to the air-lift culture (Fig. 1c). As a consequence, the frequency of medium exchanges may be reduced to one medium change per week. Furthermore, the reduced frequency of medium changes ensures that the medium conditioning lasts longer and an improved tissue quality is achieved. The ThinCert™Plate design consists of notches for fixing the position of the inserted ThinCert™ cell culture inserts (Fig. 2). This ensures a stable and predictable position of the inserts during the entire process of cell culture. With ThinCert™ cell culture inserts and the optimised ThinCert™Plate Greiner Bio-One provides the professional answer to the challenges of tissue reconstruction *in vitro*.

Figure 2: ThinCert™Plate: Notches (arrows) secure the position of the ThinCert™ cell culture inserts during cell culture.

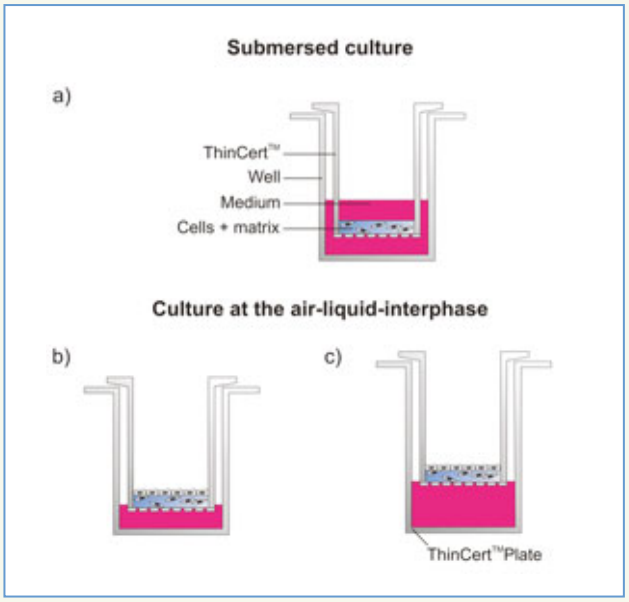


Figure 1: Reconstruction of a full thickness skin *in vitro*. a) A permeable membrane support carries fibroblasts in an extracellular matrix (e.g. Collagen). This dermis equivalent is cultivated under submersed culture conditions. b) Keratinocytes are superimposed upon the dermis equivalent and differentiated at the air-liquid-interphase (air-lift culture). If performed in a regular cell culture plate only a very limited medium volume is available for the air-lift culture. c) The ThinCert™Plate enables the air-lift culture to access an increased medium volume thereby reducing the frequency of medium exchanges. This allows the cells to stay longer in their conditioned environment which may lead to an increase in tissue quality.

Cat.-No.	657 110	665 110
Well format	6 well	12 well
Total volume per well [ml]	30	10
Working volume in air-lift culture [ml]	20	4
Sterile	+	+
Lid	+*)	+*)
Quantity per bag/case	1/50	1/60

*) with condensation rings

Notes

INFORMATION

Interested in other vessels?

Have a look at chapter 4 and 5 of our catalogue

- Dishes and Plates for Microbiology / Bacteriology (p. 116-118)
- PS / PP / PET Tubes (p. 125-131)
- Multipurpose Containers and Beakers (p. 132-135)

Further literature on Cell Culture:

- Brochure “Cell & Tissue Culture Labware” (F071 067)

2 HTS-Microplates

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UV-Star® Microplates 100
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HTS-Microplates

1. Standard Microplate Footprint
The manufacture of user-friendly products is one of our most important goals. All microplates manufactured by Greiner Bio-One have a uniform footprint (Fig. 1) which is conform to the recommendation of the American National Standards Institute (ANSI 1-2004). For detailed information about the external dimensions of our microplates and the conformity with ANSI standards, please visit our website:
www.gbo.com/bioscience – or ask for data sheets and customer drawings.
For further information about ANSI standards, please visit the society's website: www.slas.org.

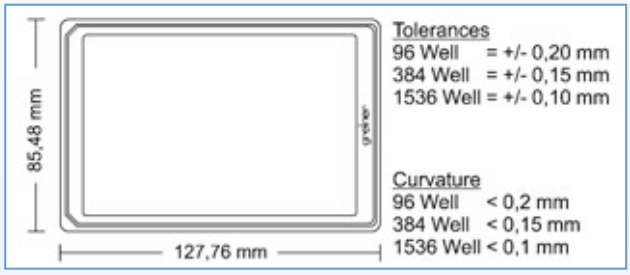


Figure 1:
Footprint and tolerances of standard microplates

2. Material
Polypropylene (PP) and **polystyrene** (PS) are the standard materials used to manufacture the majority of microplates. Polystyrene is a highly clear polymer with excellent optical properties which makes it ideal for precise optical measurements. Polystyrene is also characterised by its ability to bind biomolecules, such as proteins, and it is therefore often used for manufacturing immunological products. Polystyrene is suitable for work with cell cultures.

Polypropylene is characterised by its excellent chemical and thermal stability. It is the ideal polymer for storage vessels or microplates. Polar molecules, such as proteins or DNA, are binding less to polypropylene than to polystyrene.

In addition to polystyrene and polypropylene microplates, Greiner Bio-One manufactures microplates with special requirement profiles, such as the UV-Star® or SCREENSTAR microplates made from different **cycloolefins** (cycloolefin co-polymer COC / cycloolefin polymer COP).
These cycloolefins are characterised by their low level of autofluorescence (Fig. 2), exceptionally high clarity, especially in the UV range (Fig. 3), and greater chemical stability when compared with polystyrene.
A listing of chemical compatibilities of the main polymers used can be found in the → Technical Appendix.

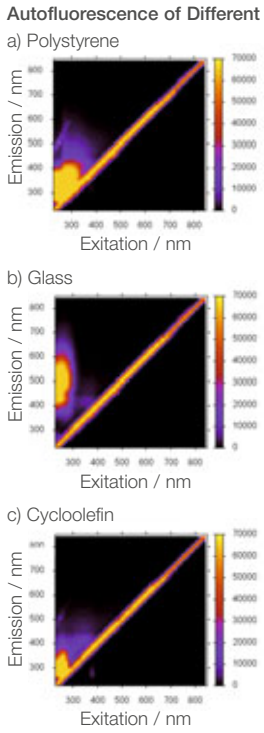


Figure 2:
Autofluorescence of polystyrene (A), borosilicate glass (B) and cycloolefin (C) in the UV. The graphs display autofluorescence in a 2-D diagonal plot, where the diagonal peak represents equal excitation and emission wavelengths. Due to energetic loss, emitted light generally exhibits a higher wavelength than that of excitation, therefore autofluorescence only occurs when the emission wavelength is above the excitation. The lowest autofluorescence can be detected in the cycloolefin micoplates (C), followed by the glass bottom microplate (B).

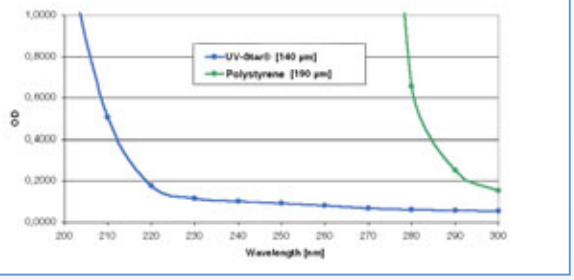


Figure 3:
Light transmission in the UV range. Comparison of polystyrene and UV-Star®

3. µClear® and UV-Star®

The move from isotopic to non-isotopic assays (fluorescence/luminescence), and new applications in high-throughput and high-content screening increased the demand for clear bottom plates, microplates with pigmented walls and thin film bottoms.
Up to now, clear bottom microplates have mostly been manufactured using a two-component injection moulding procedure by sticking or welding the components together. The development of a completely new and patented processing technique has made it possible for us to produce microplates with ultra-thin films, without the use of adhesives or solvents – the µClear® and UV-Star® products. This special method eradicates the risk of leaking wells (Fig. 4).

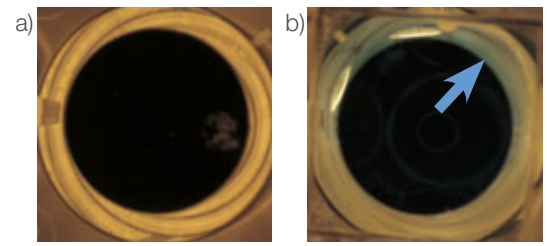


Figure 4:
Wells filled with methylene blue after threefold freezing and thawing:
a) single well of a Greiner Bio-One UV-Star® microplate
b) single well of a 96 well UV-transparent microplate of a competitor

The choice of suitable films is the decisive factor, and this will influence the quality of a clear bottom microplate. Strict controls before and during production guarantee a constant quality. Polarised light is either not depolarised (UV-Star®) or is only depolarised to a slight degree (µClear®) and the autofluorescence of the microplates is minimised (Fig. 5).

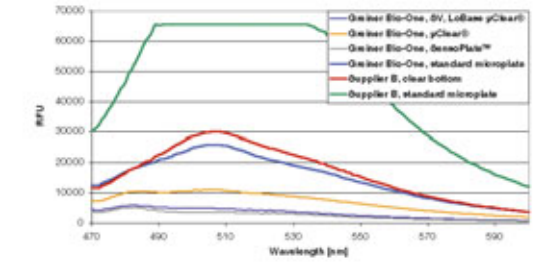


Figure 5:
Autofluorescence of different 384 well microplates at an excitation wavelength of 485 nm

The 96 well µClear® microplates and 384 well µClear® microplates have a film thickness of 190 µm +/- 20 µm. In the 1536 well microplates with a transparent bottom (µClear®) the film thickness is 75 µm +/- 10 µm. UV-Star® microplates generally have a film thickness of 135 µm +/- 10 µm.

4. SensoPlate™ and SensoPlate™ Plus Glass Bottom Microplates

SensoPlate™ glass bottom microplates consist of a black pigmented polystyrene frame on to which a 175 µm thick borosilicate glass bottom is bonded. Thanks to the high optical quality of the glass bottom as well as the minimal bending, SensoPlate™ microplates are especially recommended for fluorescence correlation spectroscopy and sophisticated microscopic applications.

5. Black or White?

White microplates are usually used for luminescence measurements (e.g. Luciferase Reporter Assays) and black microplates for fluorescence measurements (e.g. Green Fluorescence Protein). The critical properties in these methods, such as background, autofluorescence or crosstalk are considerably improved by the use of black or white pigmented microplates. The optical and physical properties of the Greiner Bio-One microplates were investigated in our laboratory. Higher pigment concentrations produced a much lower autofluorescence of the microplates. At shorter wavelengths, this influence is more pronounced than at the normal fluorescein wavelength combination of 485/520 nm (Fig. 6, 7). When comparing different white fractions, the same results were obtained for phosphorescence.

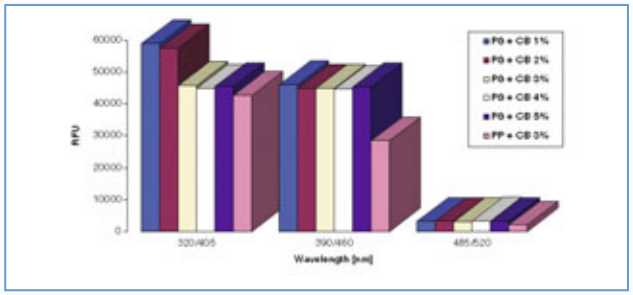


Figure 6:
Influence of the black pigment fraction and the wavelength used on the autofluorescence of 96 well microplates

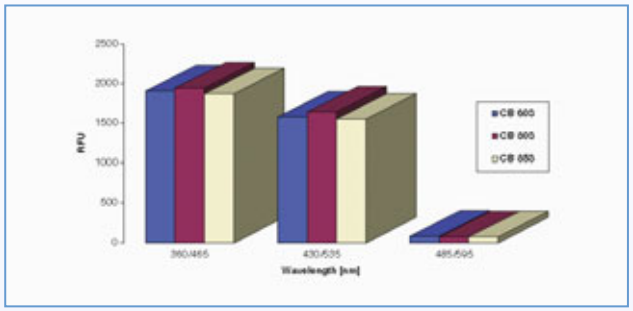


Figure 7:
Influence of different black pigments on the autofluorescence of 96 well microplates

6. MICROLON®, FLUOTRAC™, LUMITRAC™

MICROLON®, FLUOTRAC™, and LUMITRAC™ stand for the quality of our immunology products. MICROLON® are clear microplates for transmission measurements. FLUOTRAC™ are black microplates for fluorescence measurements. LUMITRAC™ are white microplates for luminescence measurements.
MICROLON® 600, FLUOTRAC™ 600 and LUMITRAC™ 600 are high binding polystyrene surfaces that have been specifically treated to provide an increased protein binding.
MICROLON® 200, FLUOTRAC™ 200 and LUMITRAC™ 200 are medium binding (med. binding) polystyrene surfaces. The polystyrene surface of a medium binding microplate is more hydrophobic than the surface of a high binding microplate, and therefore tends to be more suitable for non-polar proteins and peptides. The consistency and reproducibility of our immunology products is constantly evaluated using an ELISA (Fig. 8).

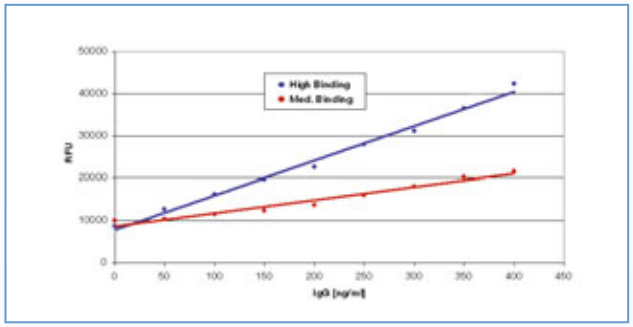


Figure 8:
Fluorescence ELISA

In general, high binding microplates are recommended for ELISAs. The protein binding to the polystyrene surface can vary greatly and depends, among other things, on properties such as charge or size. When developing a new assay, it is therefore advisable to compare high binding and medium binding microplates in advance (→ see chapter 3).

We will be glad to supply samples for evaluation.

7. Non-binding Surfaces

Non-binding surfaces from Greiner Bio-One are characterised by their low binding capacity for biomolecules such as DNA, RNA, peptides and proteins. The repellent property of the non-binding surfaces for biomolecules can be advantageous in biochemical assays by increasing the sensitivity, reducing the background and improving the signal-to-noise ratio.

Achieved through a chemical modification of the resin rather than a resin mixture with potential to leach, the non-binding surface from Greiner Bio-One is stable under common assay conditions and does not degrade during short-term storage. The complete portfolio of non-binding microplates can be found on p. 94-96

8. Cell Culture Products / CELLSTAR® / TC

The polystyrene surface of an untreated microplate is hydrophobic and does not offer adherent cell lines a surface conducive to growth. Cell culture microplates from the CELLSTAR® range are specifically treated. This treatment leads to polar groups, such as carboxy and hydroxy groups, being incorporated into the plastic surface, making it hydrophilic. This significantly improves the adhesion of cells and the binding of proteins to the plastic surface. CELLSTAR® products are consistently evaluated using different cell lines.
Cell culture treated microplates → chapter 1.

9. Lids for Microplates (→ chapter 12)

Four different polystyrene lid designs are available:

- High profile lids
- High profile lids with condensation rings
- Low profile lids
- Ultra low profile lids

Lids are available in two options, sterile and non-sterile. If microplates are supplied with lids, as in the case of CELLSTAR® products, the 96 well microplates always include lids with a high profile (“lid, high profile”) and the 384 well microplates always include plate lids with a low profile (“lid, low profile”). In addition all products are also available without lids, which means that the type of lid can be selected as required.

Greiner Bio-One microplates:

- Are manufactured under DIN ISO 9001 guidelines
- Can be traced all the way back to production through a defined LOT number system
- Footprint compatible with automated systems
- Are free of detectable endotoxins (0.03 EU/ml) and regularly tested using an FDA-approved kinetic turbidimetric LAL-test (Limulus Amoebocyte Assay)
- Are analysed for detectable DNase, RNase and human DNA (→ Quality p. 6-7)
- Are manufactured without the use of silicon-based mould release
- Are free of biocides and antistatics
- Are manufactured out of raw materials tested for leachables
- Barcode-labelling on request (→ p. 220)

!

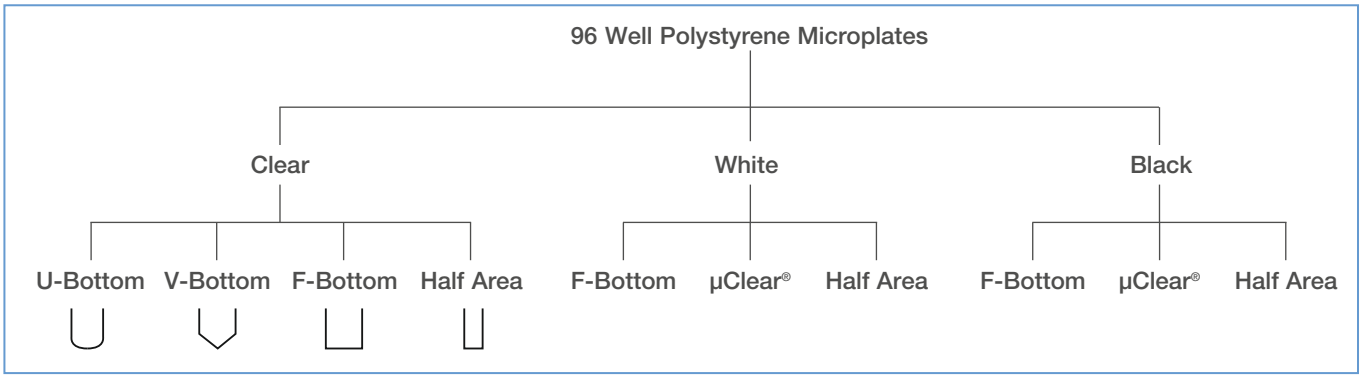
An overview of all 96 well, 384 well and 1536 well microplates listed in this catalogue can be found in the Technical Appendix → p. 223-225

Further information on microplates:
→ **www.gbo.com/bioscience/hts**
→ **Forum No. 19: Base Material and Surface Modifications of Greiner Bio-One Multiwell Plates and Microplates – An Overview** (F073 793)

96 Well Microplates

Since its introduction in the 1960's applications for the 96 well microplate have continually increased to the extent that it is impossible to envisage modern research and industry without it today. Greiner Bio-One has been manufacturing microplates and strip microplates for diagnostics and immunological research for over 40 years. A large number of different 96 well microplates is available in a wide variety of surface treatments. The spectrum ranges from clear bottom microplates and completely black or white microplates to UV-Star® products.

96 Well Polystyrene Microplates



96 well polystyrene microplates are available in the following versions:

- Sterile or non-sterile
- Cell culture treated (→ p. 24-26)
- In medium binding or high binding quality (→ p. 107)
- In non-binding quality (→ p. 95)
- With cell-repellent surface (→ p. 51)
- With or without lid

Well Profile

The well profile is a critical aspect in a 96 well microplate. Different well shapes are available for each application (Fig. 1 – Fig. 4):

U-Bottom

The "U" describes the round bottom shape (Fig. 1). U-bottom microplates are ideally suited for agglutination tests.

- No sharp corners to facilitate easy and residue-free pipetting
- Suitable for +/- analyses

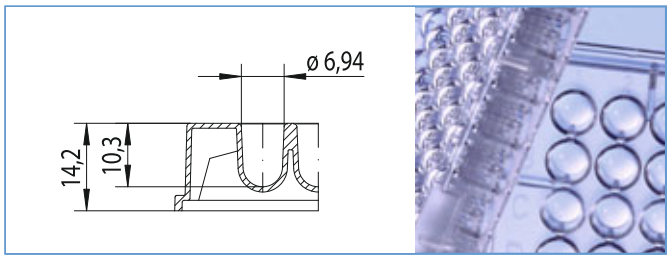


Figure 1:
Well profile: 96 well U-bottom, polystyrene
Total volume: 323 µl
Working volume: 40 – 280 µl

V-Bottom

The "V" stands for the conically tapered well bottom (Fig. 2). These microplates are ideally suited for applications in which the entire sample volume must be pipetted off.

- For precise pipetting
- Ideally suited for the storage of samples
- Suitable for +/- analyses

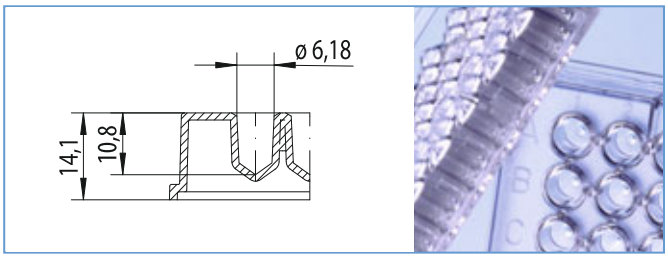


Figure 2:
Well profile: 96 well V-bottom, polystyrene
Total volume: 234 µl
Working volume: 40 – 200 µl

F-Bottom / Standard (ST)

The "F" refers to the flat well bottom (Fig. 3). This well type is ideal for precise optical measurements. The measuring light source is not deflected by the well profile.

- Excellent optical properties
- For precise optical measurements
- For microscopic applications (bottom reading)

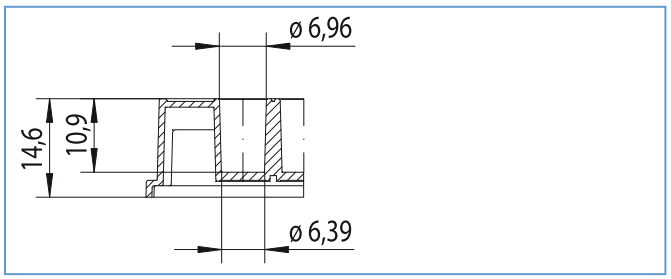


Figure 3:
Well profile: 96 well F-bottom / ST, polystyrene
Total volume: 382 µl
Working volume: 25 – 340 µl
Growth area: 32 mm²

F-Bottom / Chimney Well

The standard flat bottom microplate (Fig. 3) has the same well profile as the chimney well microplate (Fig. 4). The difference from the standard plate is the chimney-like arrangement of the wells. Each well stands on its own (Fig. 5). Therefore the risk of sample carryover and cross contamination is minimised.

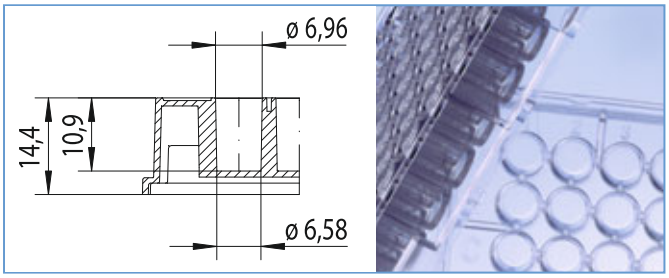


Figure 4:
Well profile: 96 well F-bottom / chimney well, polystyrene
Total volume: 392 µl
Working volume: 25 – 340 µl
Growth area: 34 mm²

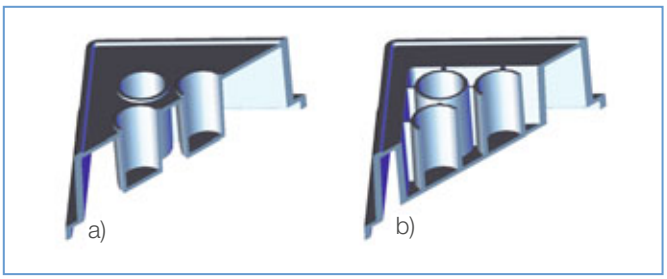


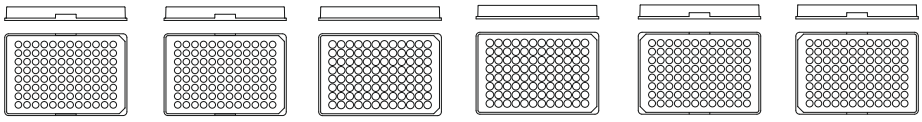
Figure 5:
a) Well profile: 96 well F-bottom / ST, polystyrene
Total volume: 382 µl
Working volume: 25 – 340 µl
Growth area: 32 mm²
b) Well profile: 96 well F-bottom / chimney well, polystyrene
Total volume: 392 µl
Working volume: 25 – 340 µl
Growth area: 34 mm²

96 Well Polystyrene Microplates

solid bottom, clear

ELISA Microplates p. 107
Cell Culture Microplates p. 24

Free of detectable DNase, RNase, human DNA
non-pyrogenic



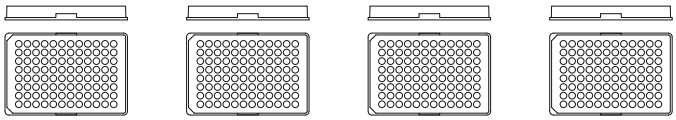
Cat.-No.	650 101	650 161	651 101	651 161	655 101	655 161
Well profile	U-bottom	U-bottom	V-bottom	V-bottom	F-bottom/ST	F-bottom/ST
Bottom	solid	solid	solid	solid	solid	solid
Colour	clear	clear	clear	clear	clear	clear
Binding	-	-	-	-	-	-
Sterile	-	+	-	+	-	+
Lid	-	-	-	-	-	-
Quantity per bag/case	10/100	2/100	10/100	2/100	10/100	2/100

96 Well Polystyrene Microplates

solid bottom, white / black

Cell Culture Microplates p. 25

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	655 075	655 074	655 077	655 076
Well profile	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well
Bottom	solid	solid	solid	solid
Colour	white	white	black	black
Binding	LUMITRAC™ 200 med. binding	LUMITRAC™ 600 high binding	FLUOTRAC™ 600 high binding	FLUOTRAC™ 200 med. binding
Sterile	-	+	+	-
Lid	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40

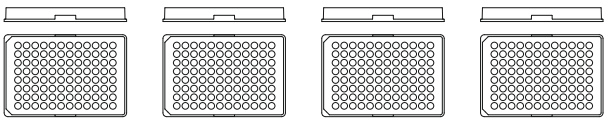
96 Well Polystyrene Microplates

µClear®, white / black

Cell Culture Microplates p. 26

Cat.-No. 655 096 also available in cycloolefin (Cat.-No. 655 809)

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	655 095	655 094	655 097	655 096
Well profile	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well
Bottom	µClear®	µClear®	µClear®	µClear®
Colour	white	white	black	black
Binding	med. binding	high binding	high binding	med. binding
Sterile	-	+	+	-
Lid	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40

96 Well Half Area Polystyrene Microplates

For pharmaceutical drug screening, the simplest way of reducing the sample volume is to use high-format microplates, such as the 384 well or 1536 well microplates. However, many research groups in the development field or companies in the field of ELISA diagnostics shy away from changing to high-format plates, due to the automation that this entails. The 96 well half area microplates offer an interesting alternative here. They can be pipetted manually without any problem but at the same time allow a reduction of the sample volume by up to 50 %.

Further information on Half Area Microplates:
→ **Forum No. 16: 96 Well Half Area Microplates and their Application in Fluorescence, Luminescence and Transmission Measurements** (F073 121)

Well profile (Fig. 6)

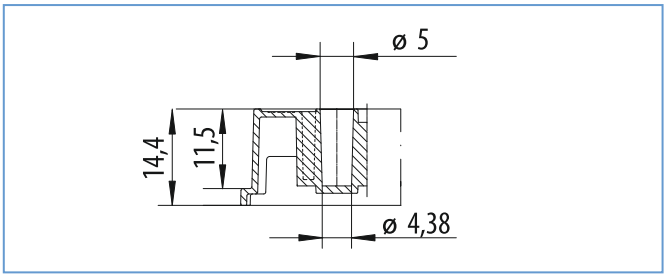


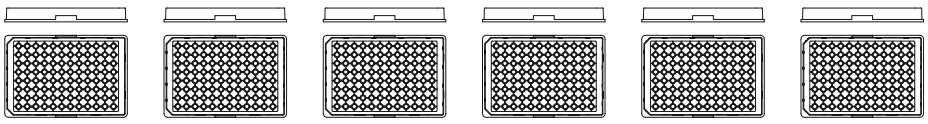
Figure 6:
Well profile: 96 well half area
Total volume: 199 µl
Working volume: 15 – 175 µl
Growth area: 15.0 mm²

96 Well Half Area Microplates

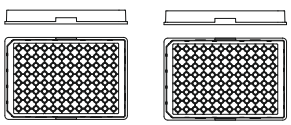
- **Cell Culture Microplates p. 26**
- **Medium binding and high binding quality p. 107**
- **UV-Star® Microplates p. 101**

- Reduction of sample volume by up to 50 %
- Standardised pathlength (1 cm=170 µl, 0.5 cm=80 µl)

Free of detectable DNase, RNase, human DNA
non-pyrogenic

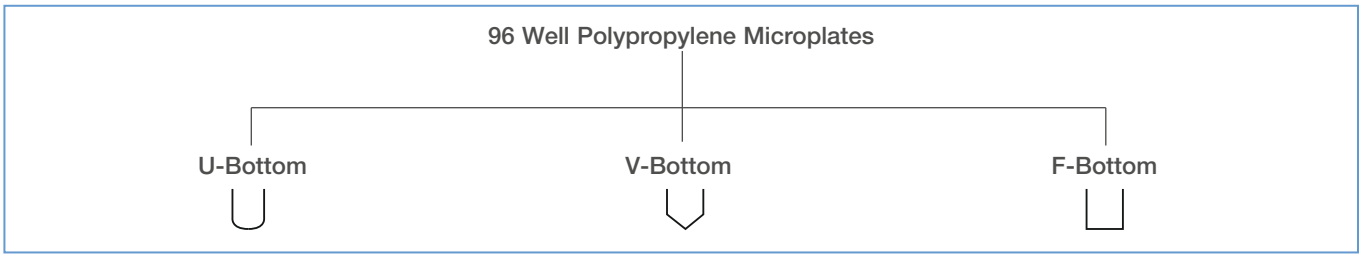


Cat.-No.	675 161	675 101	675 074	675 075	675 077	675 076
Well profile	half area	half area	half area	half area	half area	half area
Bottom	solid	solid	solid	solid	solid	solid
Colour	clear	clear	white	white	black	black
Binding	-	-	high binding	med. binding	high binding	med. binding
Sterile	+	-	+	-	+	-
Lid	-	-	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40	10/40	10/40



Cat.-No.	675 095	675 096
Well profile	half area	half area
Bottom	µClear®	µClear®
Colour	white	black
Binding	med. binding	med. binding
Sterile	-	-
Lid	-	-
Quantity per bag/case	10/40	10/40

96 Well Polypropylene Microplates



Polypropylene (PP) has low biomolecular binding characteristics, a high temperature tolerance, and is resistant to many standard laboratory chemicals, such as DMSO.
From black polypropylene microplates for fluorescence polarisation to white microplates for scintillation proximity assays (SPA), the 96 well polypropylene range has all you need.

96 well polypropylene microplates are available in the following versions:
- Sterile
- Non-sterile
- Natural, black or white version
- Barcode-labelled on request (→ p. 220)

Polypropylene microplates are ideally suited for the following applications:
- Long-term storage of active agents
- Storage of DNA or RNA, stock cultures

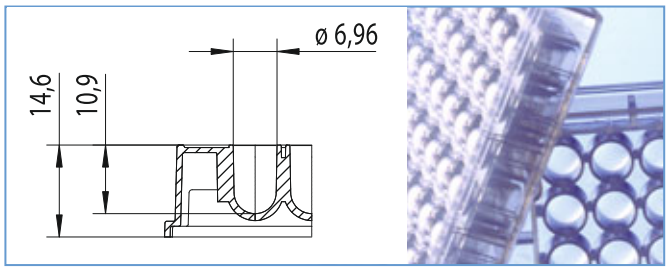


Figure 1:
Well profile: 96 well U-bottom, polypropylene
Total volume: 355 µl
Working volume: 50 – 300 µl

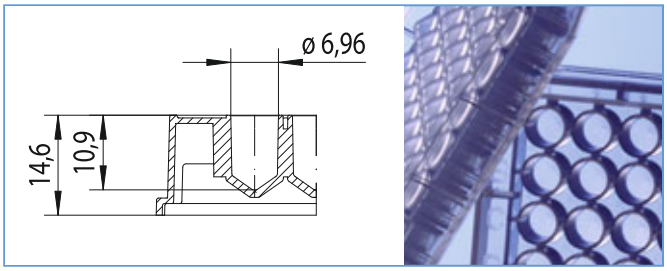


Figure 2:
Well profile: 96 well V-bottom, polypropylene
Total volume: 340 µl
Working volume: 50 – 335 µl

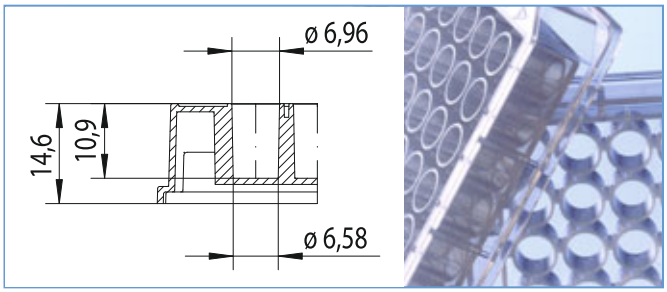


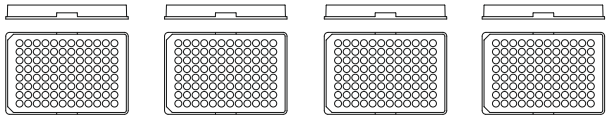
Figure 3:
Well profile: 96 well F-bottom, polypropylene
Total volume: 392 µl
Working volume: 25 – 370 µl

96 Well Polypropylene Microplates

U-bottom

- Uniform external dimensions
- Well-to-well spacing 9 mm
- Alphanumeric well coding
- High chemical resistance
- High temperature resistance (-196 °C to +121 °C)
- Sealable with adhesive films and heat sealer
- Sealable with CapMats (→ p. 209)

Free of detectable DNase, RNase, human DNA
non-pyrogenic



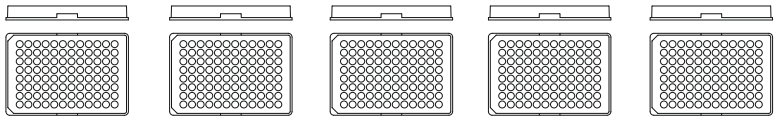
Cat.-No.	650 201	650 261	650 207	650 209
Well profile	U-bottom/ chimney well	U-bottom/ chimney well	U-bottom/ chimney well	U-bottom/ chimney well
Bottom	solid	solid	solid	solid
Colour	natural	natural	white	black
Binding	-	-	-	-
Sterile	-	+	-	-
Lid	-	-	-	-
Quantity per bag/case	10/100	10/100	10/100	10/100

96 Well Polypropylene Microplates

F-bottom / V-bottom

- Uniform external dimensions
- Well-to-well spacing 9 mm
- Alphanumeric well coding
- High chemical resistance
- High temperature resistance (-196 °C to +121 °C)
- Sealable with adhesive films and heat sealer
- Sealable with CapMats (→ p. 209)

Free of detectable DNase, RNase, human DNA
non-pyrogenic

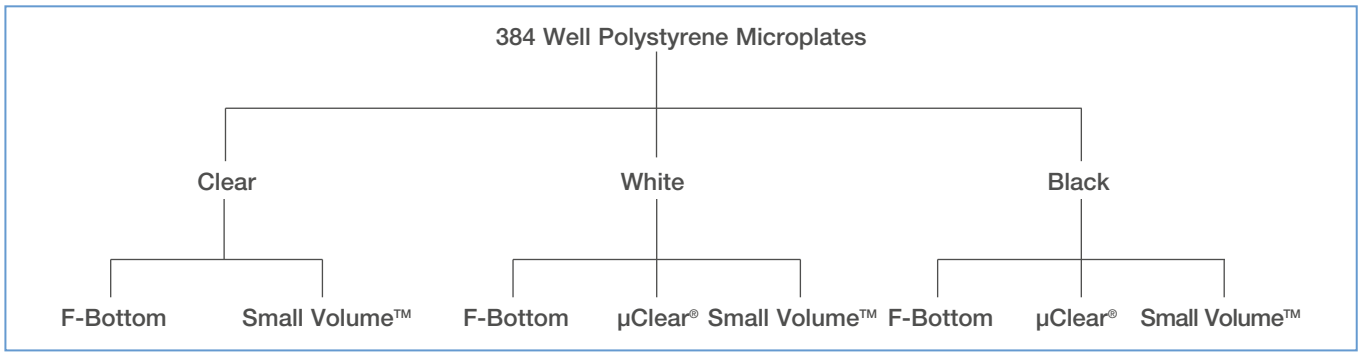


Cat.-No.	655 201	655 207	655 209	651 201	651 209
Well profile	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	V-bottom/ chimney well	V-bottom/ chimney well
Bottom	solid	solid	solid	solid	solid
Colour	natural	white	black	natural	black
Binding	-	-	-	-	-
Sterile	-	-	-	-	-
Lid	-	-	-	-	-
Quantity per bag/case	10/100	10/100	10/100	10/100	10/100

384 Well Microplates

Drug screening has undergone rapid development over the past few years. The number of tests with new targets and the number of active agents to be tested is constantly increasing. Volume reduction, simple testing and cost savings are some of the highest priorities and high format microplates with a low well volume are one of the most important tools in achieving this. One of the first higher format microplates was the 384 well plate, launched by Greiner Bio-One in 1994/1995. Compared with the 96 well standard microplate, the number of wells is quadrupled in this microplate, combined with a volume reduction from 382 µl to 131 µl. The well-to-well spacing is 4.5 mm (96 well plate: 9 mm). The external dimensions of the 384 well microplates are compatible with standard equipment and automated systems.
The 384 well microplates are available as black and white clear bottom plates (µClear®), in FLUOTRAC™, LUMITRAC™, MICROLON®, CELLSTAR®, UV-Star® or non-binding quality.

384 Well Polystyrene Microplates



384 well microplates are available in the following versions:
- Sterile or non sterile
- Cell culture treated (→ p. 27-28)
- In medium binding or high binding quality
- In non-binding quality (→ p. 96)
- In UV-Star® quality (→ p. 101)
- With or without lid
- Barcode-labelled on request (→ p. 220)

Improved Rounded Square Well Design
All wells of the 384 well microplates, with the exception of the 384 well Small Volume™ microplate, are rounded square wells, i.e. they are square with rounded corners (Fig. 2).
This design combines the advantages of the square well, i.e. flexible working volume of 15 – 110 µl, with the advantages of a round well, such as reduced wicking and bubbling.

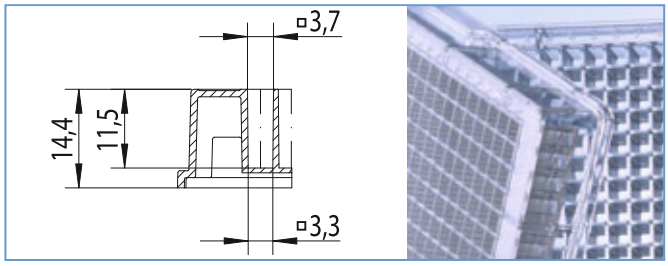


Figure 1:
Well profile: 384 well, polystyrene
Total volume: 131 µl
Working volume: 15 – 110 µl
Growth area: 10 mm²

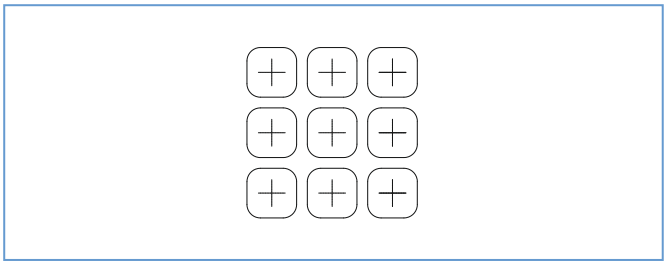
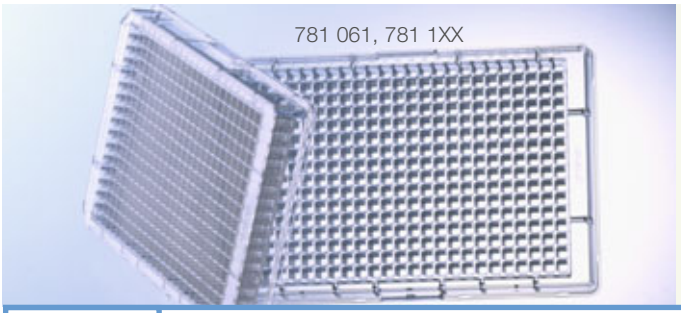


Figure 2:
Rounded square well design with improved corner radius of 1 mm



384 Well Polystyrene Microplates

solid bottom, clear

Cell Culture Microplates p. 27

Free of detectable DNase, RNase, human DNA
non-pyrogenic

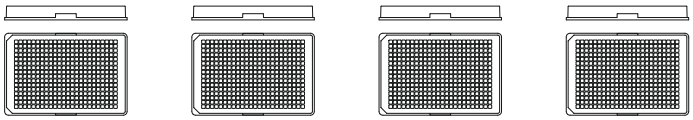
Cat.-No.	781 101	781 061	781 162	781 185	781 186
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	solid	solid
Colour	clear	clear	clear	clear	clear
Binding	-	high binding	-	-	-
Sterile	-	+	+	+	+
Lid	-	-	-	+	+
Quantity per bag/case	10/100	10/40	10/100	1/32	8/32

384 Well Polystyrene Microplates

solid bottom, white / black

Cell Culture Microplates p. 27

Free of detectable DNase, RNase, human DNA
non-pyrogenic



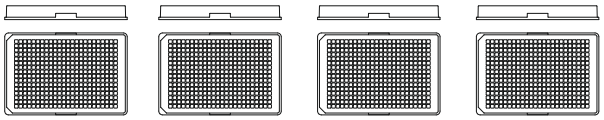
Cat.-No.	781 074	781 075	781 077	781 076
Well profile	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	solid
Colour	white	white	black	black
Binding	LUMITRAC™ 600 high binding	LUMITRAC™ 200 med. binding	FLUOTRAC™ 600 high binding	FLUOTRAC™ 200 med. binding
Sterile	+	-	+	-
Lid	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40

Free of detectable DNase, RNase, human DNA
non-pyrogenic

384 Well Polystyrene Microplates

µClear®, white / black

Cell Culture Microplates p. 28
UV-Star® Microplates p. 101



Cat.-No.	781 094	781 095	781 097	781 096
Well profile	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	µClear®	µClear®	µClear®	µClear®
Colour	white	white	black	black
Binding	high binding	med. binding	high binding	med. binding
Sterile	+	-	+	-
Lid	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40

384 Well Polypropylene Microplates

Polypropylene (PP) has low biomolecular binding characteristics, a high temperature tolerance and is resistant to many standard laboratory chemicals, such as DMSO.
From black polypropylene microplates for fluorescence to white microplates for luminescence assays, the 384 well polypropylene programme has all you need.

384 well polypropylene microplates are available in the following versions:
- Sterile (on request)
- Non-sterile
- Natural, black or white
- Barcode-labelled on request (→ p. 220)

In addition to the 384 Deep Well MASTERBLOCK® (→ p. 90), 384 well F-bottom (Fig. 1) and V-bottom (Fig. 2) polypropylene microplates extend the range of polypropylene microplates.

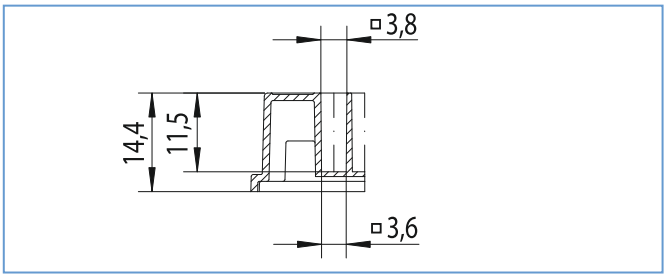


Figure 1:
Well profile: 384 well F-bottom, polypropylene
Total volume: 152 µl
Working volume: 15 – 145 µl

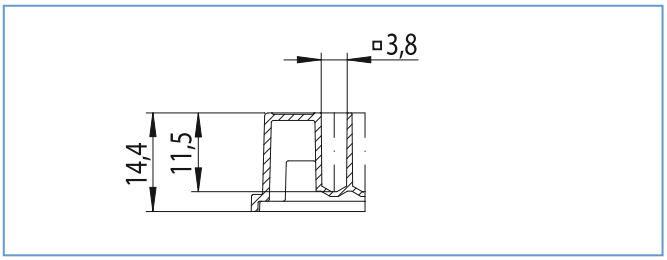
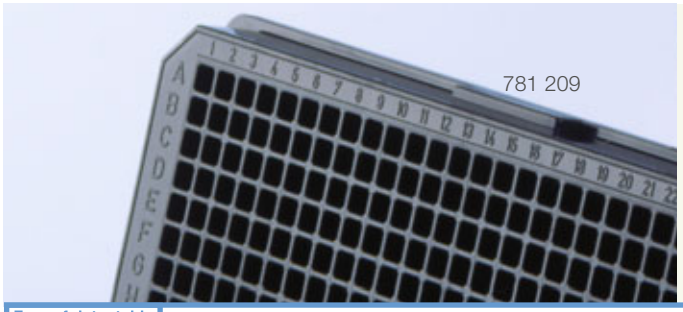
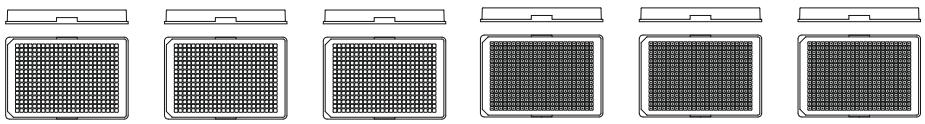


Figure 2:
Well profile: 384 well V-bottom, polypropylene
Total volume: 130 µl
Working volume: 13 – 120 µl



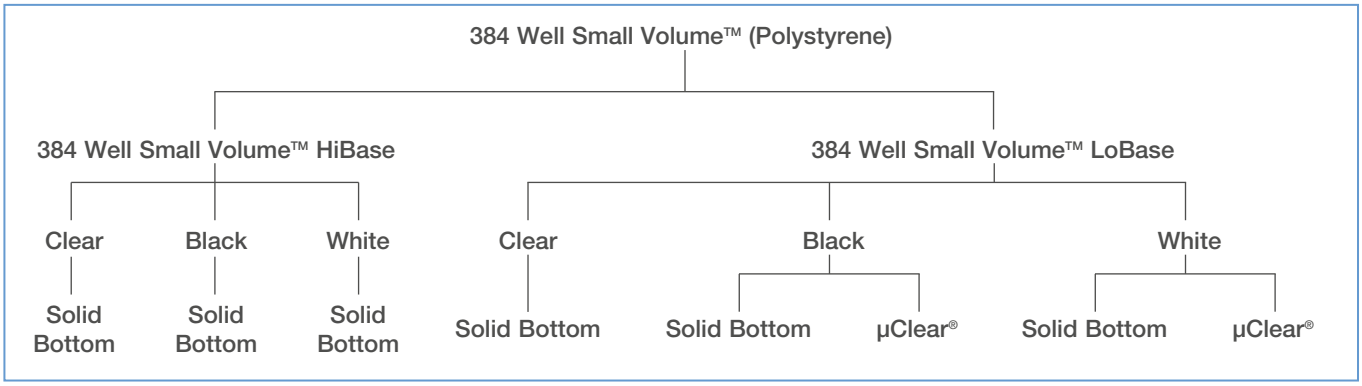
384 Well Polypropylene Microplates
solid bottom, natural / white / black

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	781 201	781 207	781 209	781 280	781 287	781 289
Well profile	F-bottom	F-bottom	F-bottom	V-bottom	V-bottom	V-bottom
Bottom	solid	solid	solid	solid	solid	solid
Colour	natural	white	black	natural	white	black
Binding	-	-	-	-	-	-
Sterile	-	-	-	-	-	-
Lid	-	-	-	-	-	-
Quantity per bag/case	10/100	10/100	10/100	10/100	10/100	10/100

384 Well Small Volume™ LoBase and HiBase Polystyrene Microplates



A small sample volume is an important goal in high-throughput screening. The substances to be tested and the reagents used are usually scarce, expensive and time-consuming to produce. In addition to a high degree of automation and the use of sensitive reader systems, the introduction of higher format microplates, such as the 384 well or the 1536 well microplate, has made a decisive contribution to reducing the sample volume.

The potential for savings in the 384 well microplate with an average working volume of 70 – 80 µl is relatively limited and successful use of 1536 well microplates requires considerable optimisation work on the instrumentation to be used.
In order to enable a savings potential in the 384 well format comparable to a 1536 well microplate, Greiner Bio-One developed a new platform with the 384 well Small Volume™ microplates. They have round wells with a conical geometry (Fig. 1 and Fig. 2). The wells have a total volume of 28 µl and a working volume of between 4 µl and 25 µl. Two different 384 well Small Volume™ microplate versions are available:

384 well Small Volume™ HiBase polystyrene microplates:
- Perfect for top reading even at low working volumes
- Savings in reagent similar to 1536 well microplates
- Suited for transmission, fluorescence and luminescence applications
- Excellent optical properties
- Available in med. binding or high binding quality (MICROLON®, FLUOTRAC™, LUMITRAC™)
- Available cell culture treated (→ p. 28)
- Available in non-binding quality (→ p. 96)

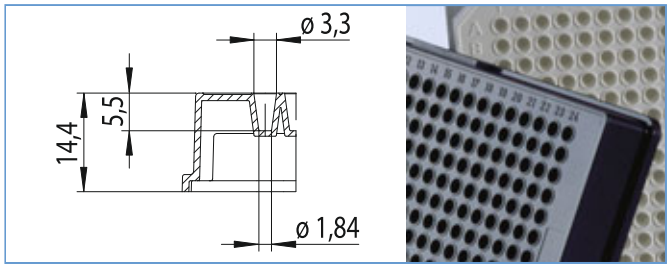


Figure 1:
Well profile: 384 well Small Volume™, HiBase
Total volume: 28 µl
Working volume: 4 – 25 µl
Growth area: 2.7 mm²

384 well Small Volume™ LoBase polystyrene microplates:
- Perfect for bottom reading even at low working volumes
- Savings in reagent similar to 1536 well microplates
- Suited for transmission, fluorescence and luminescence applications
- Excellent optical properties
- Available cell culture treated (→ p. 28)
- Available in med. binding or high binding quality

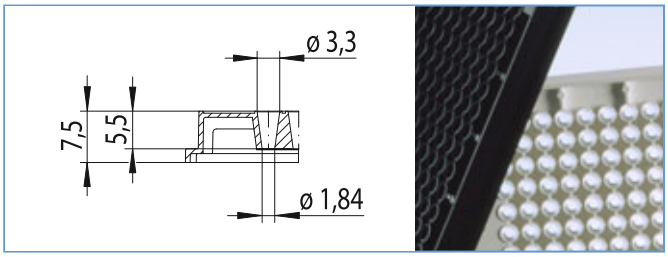
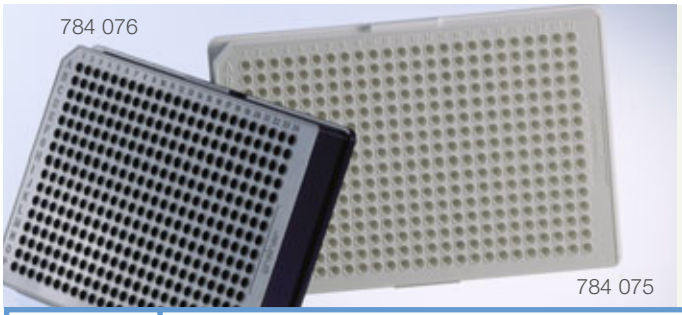


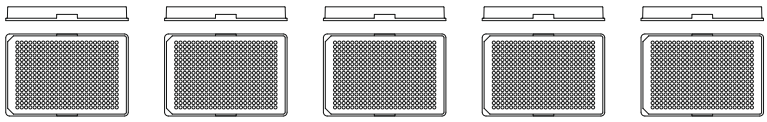
Figure 2:
Well profile: 384 well Small Volume™, LoBase
Total volume: 28 µl
Working volume: 4 – 25 µl
Growth area: 2.7 mm²



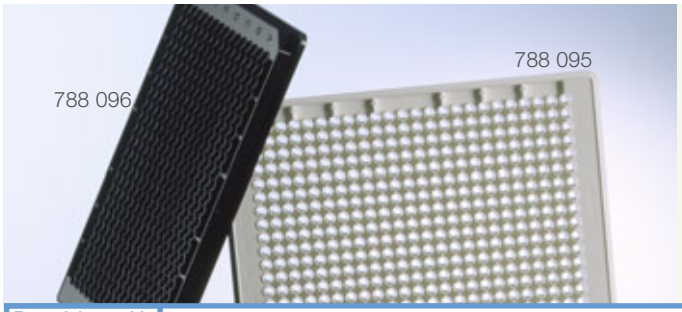
384 Well Small Volume™ HiBase Polystyrene Microplates

Cell Culture Microplates p. 28

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	784 101	784 075	784 075-25	784 076	784 076-25
Well profile	Small Volume™	Small Volume™	Small Volume™	Small Volume™	Small Volume™
Bottom	solid	solid	solid	solid	solid
Colour	clear	white	white	black	black
Binding	-	med. binding	med. binding	med. binding	med. binding
Sterile	-	-	-	-	-
Lid	-	-	-	-	-
Quantity per bag/case	10/40	10/40	25/150	10/40	25/150
Plate design	HiBase	HiBase	HiBase	HiBase	HiBase

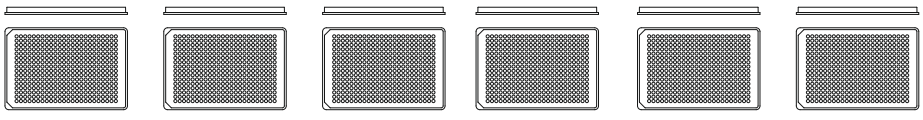


384 Well Small Volume™ LoBase Polystyrene Microplates

Cell Culture Microplates p. 28

Cat.-No. 788 096 also available in cycloolefin (Cat.-No. 788 876)

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	788 101	788 161	788 075	788 076	788 095	788 096
Well profile	Small Volume™	Small Volume™	Small Volume™	Small Volume™	Small Volume™	Small Volume™
Bottom	solid	solid	solid	solid	µClear®	µClear®
Colour	clear	clear	white	black	white	black
Binding	-	-	med. binding	med. binding	med. binding	med. binding
Sterile	-	+	-	-	-	-
Lid	-	-	-	-	-	-
Quantity per bag/case	10/80	10/80	10/80	10/80	10/80	10/80
Plate design	LoBase	LoBase	LoBase	LoBase	LoBase	LoBase

384 Deep Well Small Volume™ Polypropylene Microplate

The 384 Deep Well Small Volume™ polypropylene microplate offers new possibilities for drug discovery:

- Standardised plate geometry (conform to ANSI 1-2004)
- Large working volume from 1 µl to 90 µl (Fig. 1)
- Dead volume below 1 µl
- Focused liquid samples (Fig. 2)
- No loss of valuable compounds

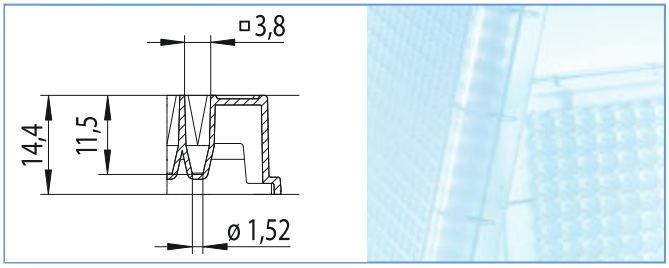


Figure 1:
Well profile: 384 Deep Well Small Volume™
Total volume: 107 µl (21 µl in the frustrum)
Working volume: 1 – 90 µl

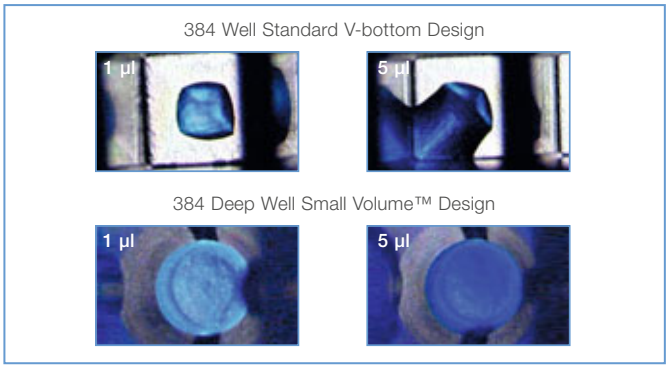


Figure 2: Location of liquid at the bottom of different microplate wells

The 384 Deep Well Small Volume™ polypropylene microplate is especially suited

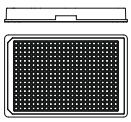
- **For direct compound transfer and preparation of assay-ready plates:**
  The focused aggregation of even small sample volumes in the well centres (Fig. 2) allows the transfer of small amounts of highly concentrated compound solutions with pin tools or capillary-based liquid handling systems. Direct compound transfer of 50 nl from storage to assay plate is possible and pre-dilution of concentrated compounds becomes redundant.
- **For pre-dilutions:**
  If pre-dilution of compounds is required by the application, e.g. for sensitve cell-based assays, the working volume of 90 µl allows a high dilution under the cell toxicity level of DMSO.
- **As storage plate:**
  Polypropylene, the base polymer of the 384 Deep Well Small Volume™ microplate has low binding characteristics, a high temperature tolerance, and is resistant to many standard laboratory chemicals, such as DMSO.
- **For sealing:**
  The square well geometry at the top of the wells with pronounced sealing rims facilitates heat sealing.
- **For automation:**
  The standardised microplate footprint and well geometry enables efficient integration with automated systems.

! Further information on 384 Deep Well Small Volume™ Polypropylene Microplates
→ **Forum No. 11: 384 Well Storage Plate reducing compound consumption and supporting assay miniaturisation** (F073 000)

384 Deep Well Small Volume™ Polypropylene Microplate

- White and black versions are available on request

Free of detectable DNase, RNase, human DNA
non-pyrogenic



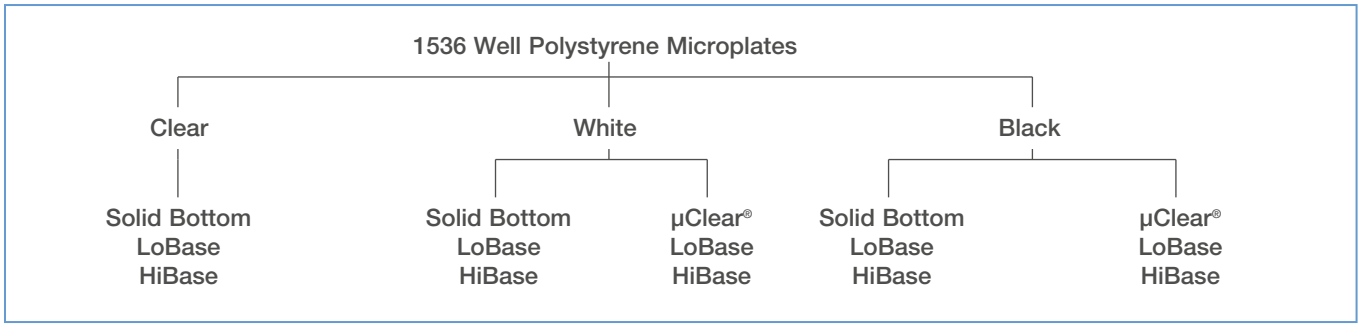
Cat.-No.	784 201
Well profile	Small Volume™
Bottom	solid
Colour	natural
Sterile	-
Lid	-
Quantity per bag/case	10/100
Plate design	Deep Well

1536 Well Microplates

The highest possible degree of automation, optimal performance and cost savings continue to be the requirements placed on microplates for high-throughput screening. In 1997, shortly after the launch of the 384 well microplates, Greiner Bio-One was the first manufacturer to introduce another innovative microplate format – the 1536 well microplate. The external dimensions were the same as those used in the 96 well and 384 well microplates. However, to utilise the available space most efficiently, the number of wells was increased fourfold from 384 to 1536.

Close cooperation with numerous users has now led to the development of a broad product range, and the constant drive towards improvements in quality has, for example, led to a reduction in curvature of the plates to < 100 µm. The 1536 well microplates are available as clear bottom variants, in clear polystyrene and completely black or white in CELLSTAR®, LUMITRAC™, FLUOTRAC™ and non-binding quality.
The product range has been further expanded by a 1536 Deep Well polypropylene microplate (→ p. 91).

1536 Well Polystyrene Microplates



1536 well polystyrene microplates are available in the following versions:
- Sterile
- Non-sterile
- Cell culture treated (→ p. 29-30)
- In medium binding or high binding quality
- With or without lid

1536 Well LoBase and HiBase Microplates

Two versions of the 1536 well microplates have been developed, the LoBase version and the HiBase version. In both versions, the total well volume is 12.6 µl, with a working volume of 3 – 10 µl.

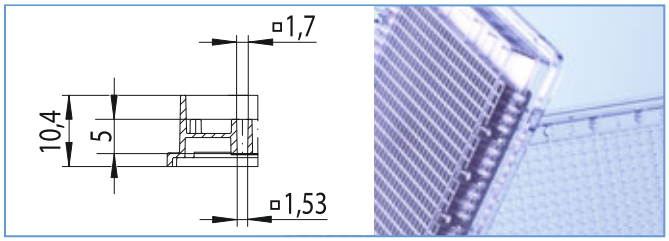


Figure 1:
Well profile: 1536 well, LoBase
Total volume: 12.6 µl
Working volume: 3 – 10 µl
Growth area: 2.3 mm²

1536 well LoBase microplates (Fig. 1):
- Ideally suited for bottom reading even at low working volumes
- Suited for transmission, fluorescence and luminescence applications
- Excellent optical properties

1536 well HiBase microplates (Fig. 2):
- Ideally suited for top reading even at low working volumes
- Suited for transmission, fluorescence and luminescence applications
- Excellent optical properties

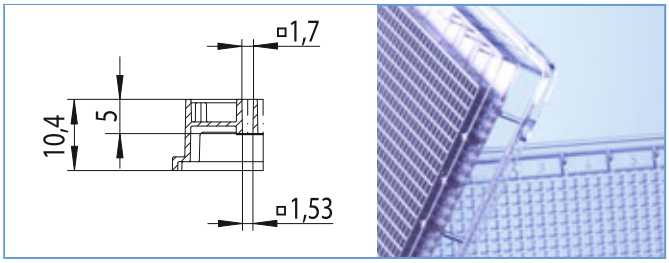


Figure 2:
Well profile: 1536 well, HiBase
Total volume: 12.6 µl
Working volume: 3 – 10 µl
Growth area: 2.3 mm²

All wells of the 1536 well microplates are rounded square wells, i.e. they are square with rounded corners (Fig. 3). This design combines the advantages of the square well, i.e. a flexible working volume of 3 – 10 µl with the advantages of a round well, such as reduced wicking and bubbling.

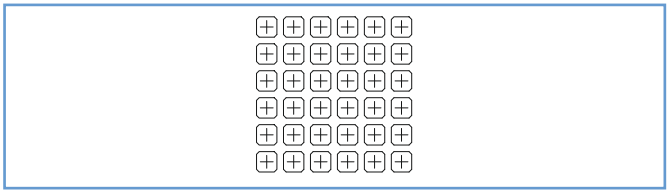
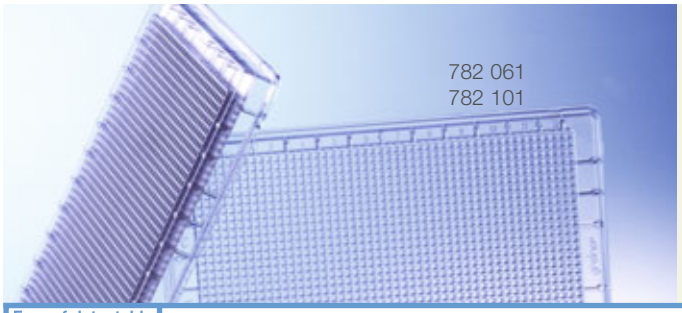


Figure 3:
The rounded square well design

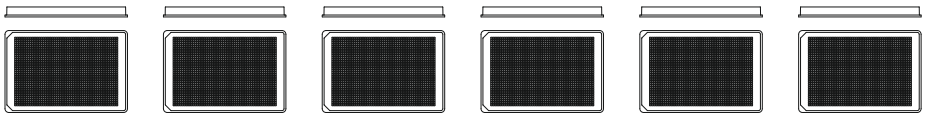


1536 Well HiBase Microplates

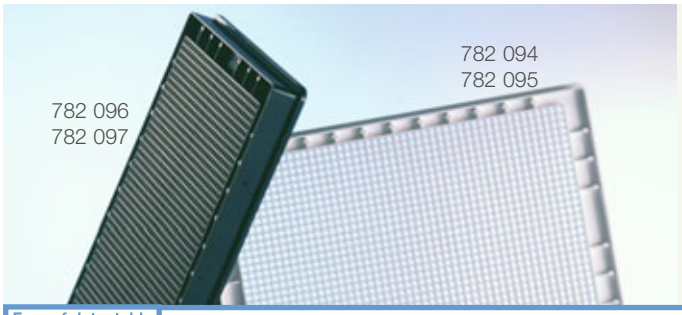
solid bottom, clear / white / black

Cell Culture Microplates p. 29

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	782 101	782 061	782 075	782 074	782 076	782 077
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	solid	solid	solid
Colour	clear	clear	white	white	black	black
Binding	-	MICROLON® 600 high binding	LUMITRAC™ 200 med. binding	LUMITRAC™ 600 high binding	FLUOTRAC™ 200 med. binding	FLUOTRAC™ 600 high binding
Sterile	-	+	-	+	-	+
Lid	-	-	-	-	-	-
Quantity per bag/case	15/60	15/60	15/60	15/60	15/60	15/60
Plate design	HiBase	HiBase	HiBase	HiBase	HiBase	HiBase



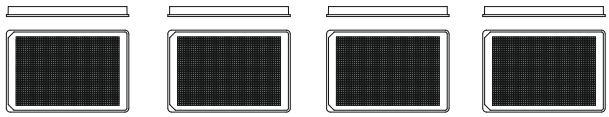
1536 Well HiBase Microplates

µClear®, white / black

Cell Culture Microplates p. 29

1536 Well SCREENSTAR Microplate p. 55

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	782 095	782 094	782 097	782 096
Well profile	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	µClear®	µClear®	µClear®	µClear®
Colour	white	white	black	black
Binding	med. binding	high binding	high binding	med. binding
Sterile	-	+	+	-
Lid	-	-	-	-
Quantity per bag/case	15/60	15/60	15/60	15/60
Plate design	HiBase	HiBase	HiBase	HiBase

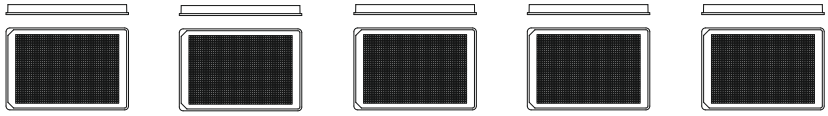
1536 Well LoBase Microplates

solid bottom, clear / white / black
µClear®, white / black

- Cell Culture Microplates p. 30
- 1536 Well SCREENSTAR Microplate p. 55

- Available in high binding quality on request

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	783 101	783 075	783 076	783 095	783 096
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	µClear®	µClear®
Colour	clear	white	black	white	black
Binding	-	LUMITRAC™ 200 med. binding	FLUOTRAC™ 200 med. binding	med. binding	med. binding
Sterile	-	-	-	-	-
Lid	-	-	-	-	-
Quantity per bag/case	15/60	15/60	15/60	15/60	15/60
Plate design	LoBase	LoBase	LoBase	LoBase	LoBase

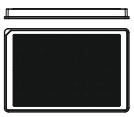
1536 Well Cycloolefin Microplate

1536 Well Cycloolefin Microplate

- White 1536 Well Cycloolefin Microplate available on request
- Cell culture treated and sterile versions available on request

- Solid bottom microplate manufactured out of DMSO-resistant cycloolefin for preparation of assay ready plates in acoustic liquid handling
- Superior optical quality with low-autofluorescence background for sensitive optical measurements
- Smooth microplate top absent of alphanumeric coding facilitates flush lid mounting for use within automated systems and improves heat sealing

Free of detectable DNase, RNase, human DNA
non-pyrogenic

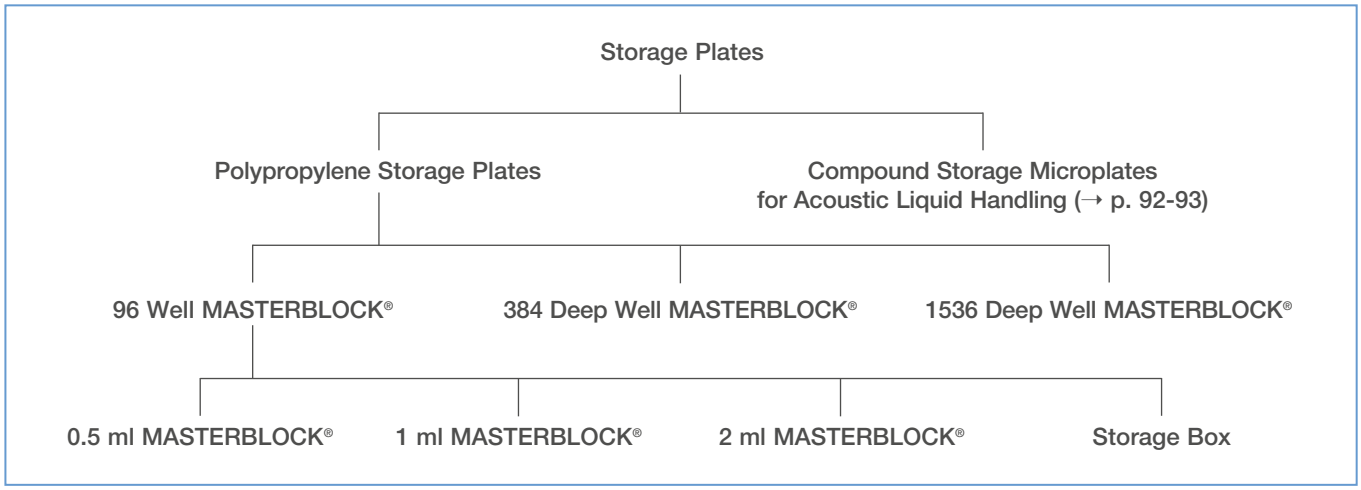


Cat.-No.	789 888
Well profile	F-bottom
Bottom	solid
Colour	black
Sterile	-
Quantity per bag/case	15/60
Plate design	HiBase

Polypropylene Storage Plates

Greiner Bio-One polypropylene microplates are perfect storage plates for active agents, patient samples or biomolecules. Their most important properties are biological inertness, resistance to numerous solvents commonly used in the laboratory, such as DMSO and temperature resistance from -196 °C to +121 °C.

The footprint is compatible with automated systems. The microplates are also characterised by elevated well walls which make it possible to easily seal them.



→ Further 96 well polypropylene microplates can be found on p. 75

→ Further 384 well polypropylene microplates can be found on p. 79

→ Compound storage microplates can be found on p. 93

96 Well Polypropylene MASTERBLOCK®

The 0.5 ml, 1 ml, and 2 ml MASTERBLOCK® (Fig. 1 – 3) are ideal microplates for storing non-human sample material but are also ideal for cultivating bacteria or yeast.

- Uniform external dimensions and tolerances
- Alphanumeric well coding
- High chemical resistance
- High temperature resistance (-196 °C to +121 °C)
- Sealable with adhesive films and heat sealer
- Sealable with CapMats (→ p. 209)
- Available sterile or non-sterile
- Barcode-labelled on request (→ p. 220)

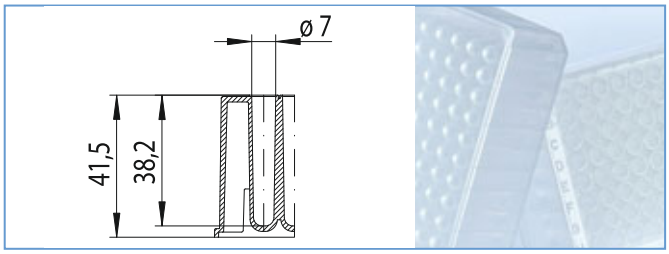


Figure 2:
Well profile: 1 ml MASTERBLOCK®, polypropylene
Total volume: 1.22 ml
Working volume: 0.05 – 1.1 ml (at RT)
0.05 – 1.0 ml (at -20 °C)

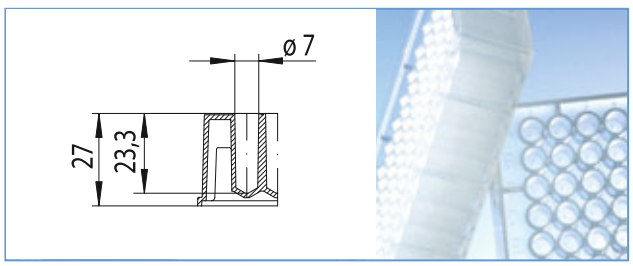


Figure 1:
Well profile: 0.5 ml MASTERBLOCK®, polypropylene
Total volume: 0.78 ml
Working volume: 0.03 – 0.65 ml (at RT)
0.03 – 0.55 ml (at -20 °C)

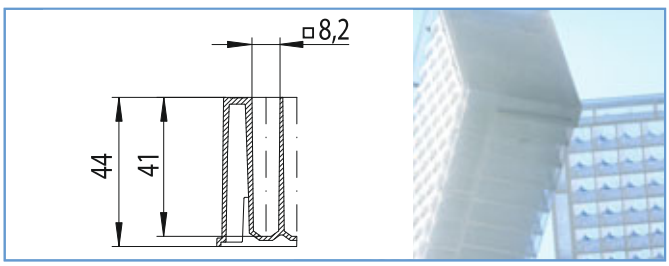


Figure 3:
Well profile: 2 ml MASTERBLOCK®, polypropylene
Total volume: 2.42 ml
Working volume: 0.1 – 2.1 ml (at RT)
0.1 – 2.0 ml (at -20 °C)

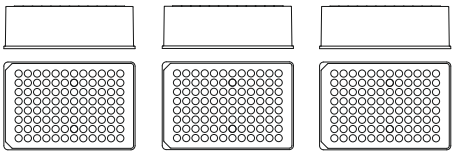
780 201
780 215
780 261

96 Well MASTERBLOCK®
1 ml

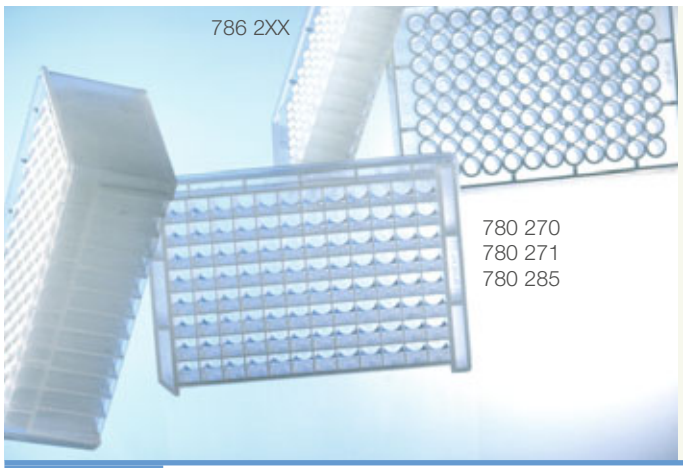
96 Well Polypropylene Microplates p. 75

CapMats p. 209

Free of detectable DNase, RNase, human DNA
non-pyrogenic



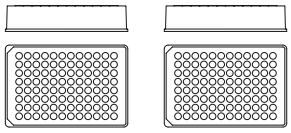
Cat.-No.	780 201	780 261	780 215
Volume [ml]	1	1	1
Well profile	U-bottom	U-bottom	U-bottom
Bottom	solid	solid	solid
Colour	natural	natural	natural
Binding	-	-	-
Sterile	-	+	-
Suitable CapMats, Cat.-No.	381 070, 381 061	381 070, 381 061	381 070, 381 061
Quantity per bag/case	1/50	1/50	5/50



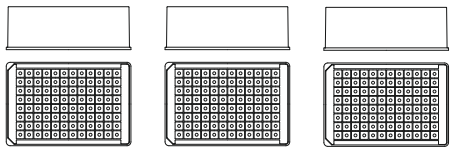
96 Well MASTERBLOCK®
0.5 ml and 2 ml

96 Well Polypropylene Microplates p. 75
CapMats p. 209

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	**786 201**	**786 261**
Volume [ml]	0.5	0.5
Well profile	V-bottom	V-bottom
Bottom	solid	solid
Colour	natural	natural
Binding	-	-
Sterile	-	+
Suitable CapMats, Cat.-No.	381 070, 381 061	381 070, 381 061
Quantity per bag/case	8/80	1/80

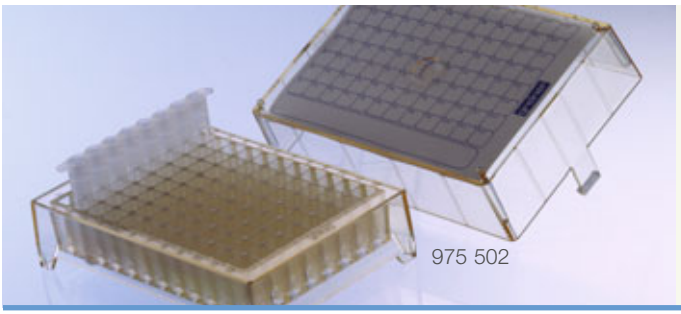


Cat.-No.	**780 270**	**780 271**	**780 285**
Volume [ml]	2	2	2
Well profile	V-bottom	V-bottom	V-bottom
Bottom	solid	solid	solid
Colour	natural	natural	natural
Binding	-	-	-
Sterile	-	+	-
Suitable CapMats, Cat.-No.	381 080, 381 081	381 080, 381 081	381 080, 381 081
Quantity per bag/case	1/50	1/50	5/50

96 Well Storage Box

The Greiner Bio-One storage box system in microplate format comes with a coding card which enables proper storage of samples, and the temperature resistance of the polypropylene vessels from -80 °C to +121 °C provides for a broad range of applications. All components of the storage box are autoclavable. The box has space for 96 vessels with a capacity of 1.3 ml each.

The individual vessels are made of biologically inert polypropylene, while the storage box itself is made of polycarbonate (PC). The storage box comes with a lid, ID-card and with/without 96 PP-vessels with mounted adhesive strips, and can be supplied both sterile and non-sterile.



96 Well Storage Box

Tubes for Storage Box p. 126

Cat.-No.	975 502	975 561	975 570
Material	PC	PC	PC
Incl. 96 polypropylene vessels, inserted	-	+	+
Sterile	-	+	-
ID card	+	+	+
Quantity per bag/case	1	50	50

384 Deep Well Polypropylene MASTERBLOCK®

In addition to the 384 well polypropylene microplates with F-bottom and V-bottom, a 384 well MASTERBLOCK® extends the range of polypropylene microplates.
The innovative design of the Deep Well MASTERBLOCK® enables numerous applications in which larger volumes are required. The MASTERBLOCK® is ideal for compound libraries and the storage of samples in general. The conical shape of the wells (Fig. 1 and 2) enables precise pipetting down to the last drop. The standardised external dimensions and the tight tolerances make liquid handling easier for robotics. The MASTERBLOCK® is also available barcode-labelled on request (→ p. 220).

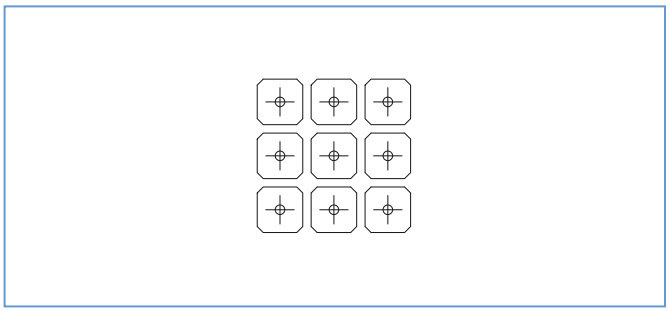


Figure 2:
Rounded square well design

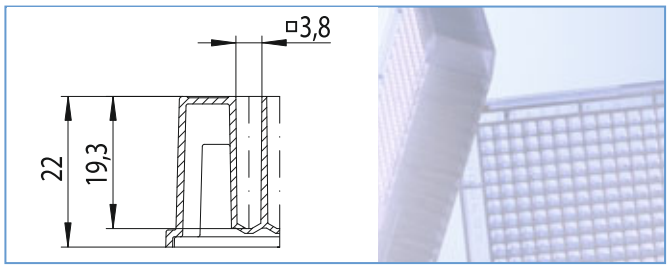


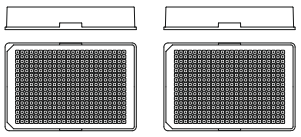
Figure 1:
Well profile: 384 Deep Well MASTERBLOCK®, polypropylene
Total volume: 240 µl
Working volume: 20 – 225 µl

384 Deep Well MASTERBLOCK®

384 Well Polypropylene Microplates p. 79

- Alphanumeric well coding
- High chemical resistance
- High temperature resistance (-196 °C to +121 °C)
- Sealable with adhesive films and heat sealer

Free of detectable DNase, RNase, human DNA
non-pyrogenic



	781 270	781 271
Cat.-No.	781 270	781 271
Well profile	V-bottom	V-bottom
Bottom	solid	solid
Colour	natural	natural
Binding	-	-
Sterile	-	+
Lid	-	-
Quantity per bag/case	6/60	6/60
Plate design	Deep Well	Deep Well

1536 Deep Well Polypropylene Microplates

The product range of the 1536 well polystyrene microplates is extended by a polypropylene storage plate (Deep Well microplate) with a total volume of 18 µl. The working volume of this plate is between 3 and 15 µl (Fig. 1).

- Uniform external dimensions and tolerances
- Alphanumeric well coding
- High chemical resistance
- High temperature resistance (-196 °C to +121 °C)
- Sealable with adhesive films and heat sealer

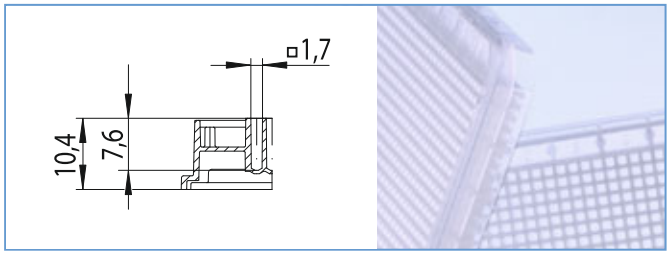
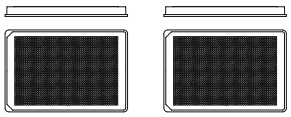


Figure 1:
Well profile: 1536 Deep Well Microplate, polypropylene
Total volume: 18 µl
Working volume: 3 – 15 µl

1536 Deep Well Polypropylene Microplates

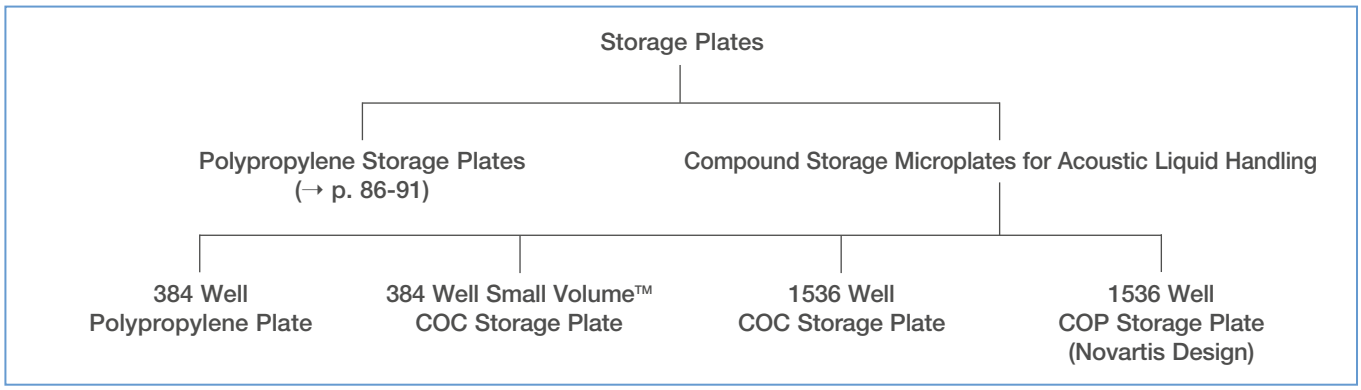
Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	782 261	782 270
Well profile	V-bottom	V-bottom
Bottom	solid	solid
Colour	natural	natural
Sterile	+	-
Lid	-	-
Quantity per bag/case	15/60	15/60
Plate design	Deep Well	Deep Well

Compound Storage Microplates for Acoustic Liquid Handling

384 Well and 1536 Well Microplates for Compound Storage



Polypropylene is still the material of choice for storage plates, but the material class of cycloolefins is becoming more routinely used because of its unsurpassed performance for a wide range of applications. In compound storage, plates made from cycloolefins offer the best combination of chemical resistance to polar solvents, like DMSO, and optical clarity. In addition, the dimensional stability and glass-like optical properties make this material ideally suited for plates in fully automated systems.
(Detailed listing of the physical properties of cycloolefins → Technical Appendix).

Microplates made from cycloolefin offer the following advantages in compound storage:
- Resistant against polar solvents such as DMSO
- Excellent water and vapour barrier function to minimise evaporation
- Nearly no extractables minimise leaching to avoid compound contamination
- Low biomolecule binding reduces the loss of compounds in storage and screening assays
- Glass-like optical properties for sensitive transmission and fluorescence measurements
- Superior mechanical stability and bottom thickness uniformity

!

Further information on Compound Storage Microplates:
→ **Brochure "Performance. Throughput. Reliability. – Intelligent Solutions for Sample Storage"** (F073 917)
→ **Forum No. 20: 1536 Well CO Microplate for Compound Storage and Acoustic Liquid Handling** (F073 795)

384 Well Polypropylene Storage Plate

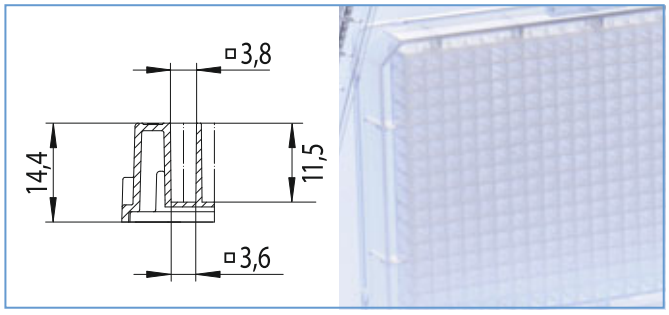


Figure 1:
Well profile: 384 well polypropylene storage plate
Total volume: 152 µl
Working volume: 15 – 145 µl

The 384 well polypropylene microplates for acoustic liquid handling are the classic storage plates. They can be easily sealed using commercially available heat sealers and bind negligible amounts of proteins or active substances (Fig. 1).

384 Well Small Volume™ COC Storage Plate

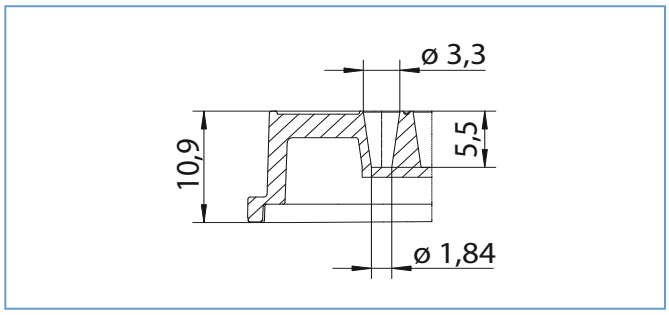


Figure 2:
Well profile: 384 well Small Volume™ COC storage plate
Total volume: 28 µl
Working volume: 4 – 25 µl

The 384 well Small Volume™ COC microplate reduces the dead volume in acoustic liquid handling. (Fig. 2). The standard 384 well grid of the microplate facilitates manual processing and visual control of individual operations.

1536 Well COC Storage Plate

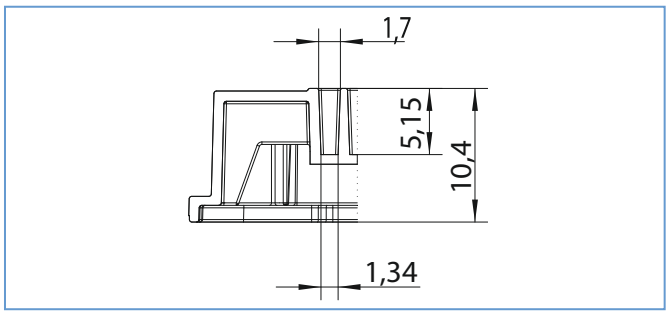


Figure 3:
Well profile: 1536 well COC storage plate
Total volume: 12 µl
Working volume: 1 – 10 µl

The 1536 well COC storage plate allows the storage of non-human sample material in the 1536 well format and reduces the dead volume in acoustic liquid handling. With a working volume of 1 – 10 µl this microplate is ideal for working with minimal sample volumes (Fig. 3).

1536 Well COP Storage Plate with Optimised Geometry for Low Evaporation

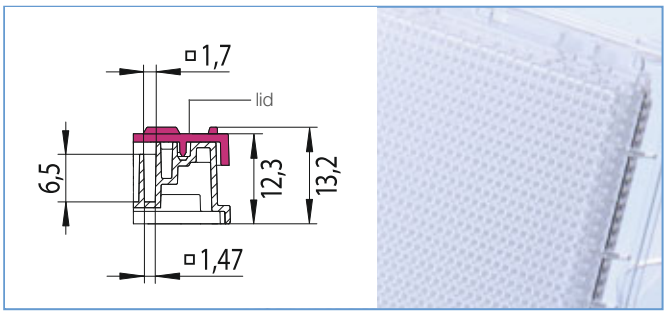


Figure 4:
Well profile: 1536 well COP storage plate with optimised geometry and lid
Total volume: 16 µl
Working volume: 1 – 14 µl

The 1536 well COP storage plate with optimised geometry was developed in collaboration with Novartis AG, Basel, CH. The microplate features a continuous groove around the edges of the plate, in which a matching cycloolefin plate lid fits (Fig. 4). This prevents evaporation and minimises edge effects.

INFORMATION

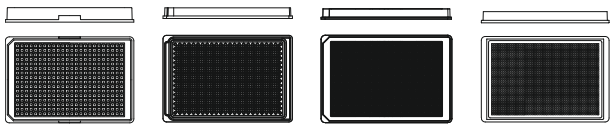
Watch our video
„High Performer, Screener, Classics – Microplates for Intelligent Storage of Active Ingredients and Samples“

384 and 1536 Well Microplates for Compound Storage

UV-Star® Microplates p. 101

- Stringent production specifications for a constant bottom quality
- Microplates are deionised and packed in antistatic bags

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	781 201-906	793 855	782 855	792 870-906
Well format	384 well	384 well	1536 well	1536 well
Well profile	F-bottom	Small Volume™	F-bottom	F-bottom
Material	polypropylene	COC	COC	COP
Bottom	solid	solid	solid	solid
Colour	natural	clear	clear	clear
Sterile	-	-	-	-
Lid	-	-	-	Cat.-No. 792 891
Quantity per bag/case	10/100	15/60	15/60	15/60

Non-binding Microplates

Microplates with Non-Binding Surface Properties for Biochemical Assays

High quality microplates with well-defined properties are essential prerequisites for reproducible results in advanced drug discovery. In addition to format and pigmentation, determining the best microplate surface for use within a specific application is a critical factor for successful high-throughput screening.

Polystyrene microplates with medium binding surfaces are commonly used for homogeneous biochemical HTS assays. Manufactured of carefully selected raw material batches, medium binding microplates demonstrate low reproducible biomolecule binding. As medium binding microplate surfaces are not physically modified, their surface characteristics are representative of pure polystyrene.

However, even low amounts of biomolecular binding (e.g. DNA, RNA, proteins, peptides) can cause an undesirable increase in background, resulting in decreased signal-to-noise ratio. Greiner Bio-One's non-binding microplate surfaces prevent unwanted non-specific binding, especially advantageous for sensitive biochemical assays.

Characterised by low protein, DNA, RNA and peptide binding properties (Fig. 1, Fig. 2) the non-binding surfaces significantly increase assay sensitivity by reducing background and improving signal-to-noise ratio (Fig. 3).

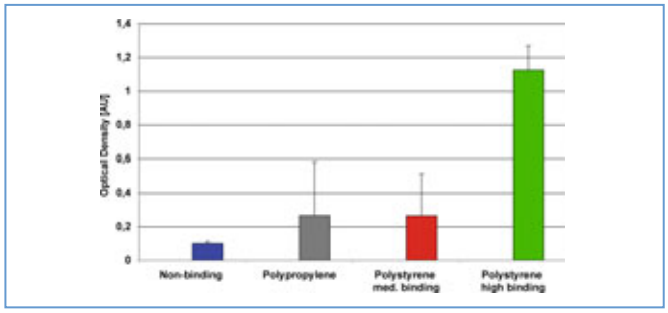


Figure 1:
Peptide binding (5.8 kDa) on different surfaces

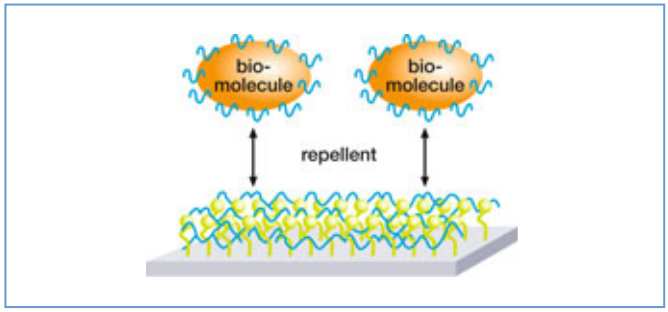


Figure 2:
Technology of the non-binding surface.
The hydrate layer, created by covalently linked functional groups, enables biomolecules to remain in solution, thereby preventing their binding to the surface.

Non-binding surfaces from Greiner Bio-One are achieved through a stable chemical modification to covalently link functional groups with the base polystyrene polymer. Under aqueous assay conditions a hydrate layer forms, preventing dissolved biomolecules from binding to the microplate surface (Fig. 2). As the non-binding surface is stable under common assay conditions (Fig. 4), there is no potential for degradation or leaching and resultant assay interference.

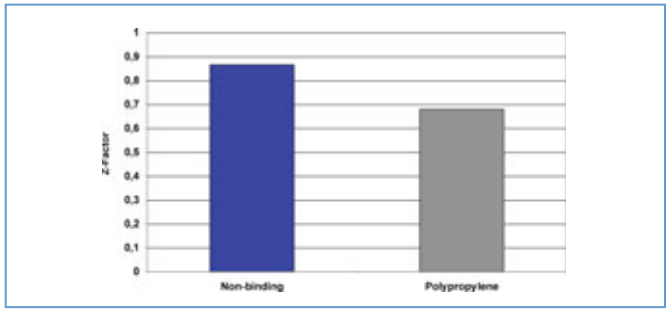


Figure 3:
Z-factor of a biochemical assay (Perkin Elmer TruPoint™ Caspase-6 assay). Comparison of non-binding versus polypropylene microplates. (The z-factor defines the precision of an assay; a factor of 1 represents the highest precision possible.) [1]

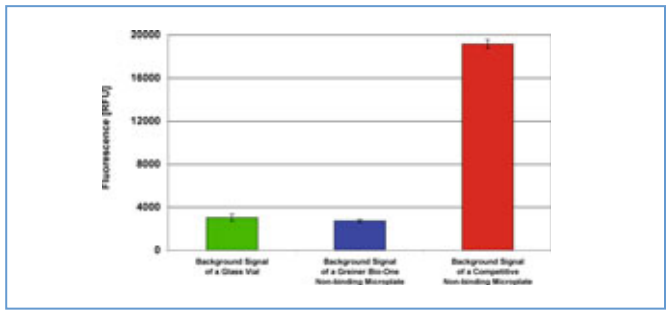


Figure 4:
Background signal using Quanti-iT™ Protein Detection Kit from Molecular Probes (Cat.-No. Q33210). The dye of the Quant-iT™ kit stains proteins as well as detergents. In the absence of protein, a high fluorescence signal indicates the presence of high amounts of dissolved detergents that have leached from the vessel surface.

Non-binding microplates are featured in 96, 384 and 1536 well formats in black, white and clear, including solid and µClear® film well bottoms.

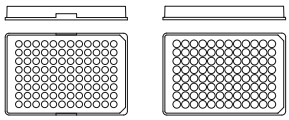
Characteristic features of the non-binding surface are:
- Ultra low non-specific biomolecular binding properties (proteins, DNA, RNA)
- Long-term surface stability without degradation or leaching
- Higher assay sensitivity with reduced background

[1] Zhang et al.: Journal of Biomolecular Screening, Vol. 4 No. 2 (1999); 67-73

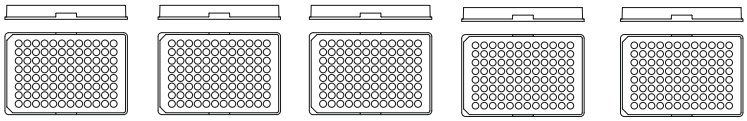
96 Well
Non-binding Microplates

96 Well Med. Binding and High Binding Microplates
p. 72

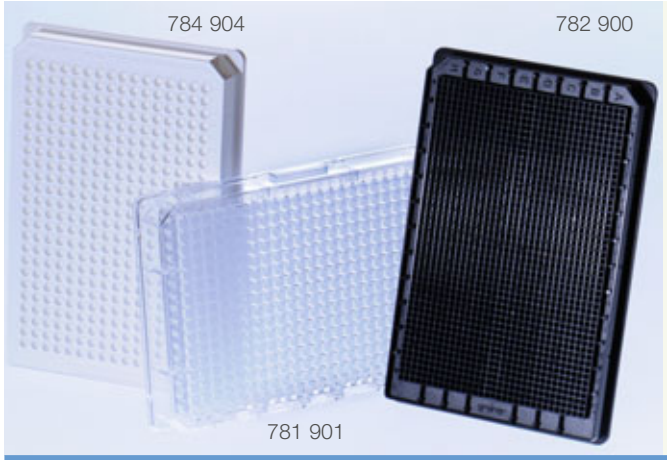
Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	650 901	651 901
Well format	96 well	96 well
Well profile	U-bottom	V-bottom
Bottom	solid	solid
Colour	clear	clear
Binding	non-binding	non-binding
Sterile	-	-
Lid	-	-
Quantity per bag/case	10/40	10/40



Cat.-No.	655 901	655 904	655 900	655 903	655 906
Well format	96 well	96 well	96 well	96 well	96 well
Well profile	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well	F-bottom/ chimney well
Bottom	solid	solid	solid	µClear®	µClear®
Colour	clear	white	black	white	black
Binding	non-binding	non-binding	non-binding	non-binding	non-binding
Sterile	-	-	-	-	-
Lid	-	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40	10/40

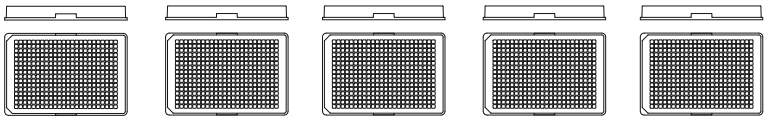


384, 1536 Well Non-binding Microplates

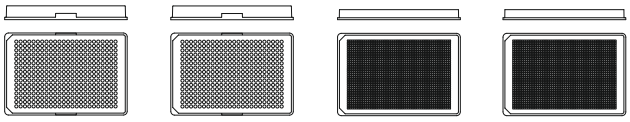
384 Well Med. Binding and High Binding Microplates
p. 77-78

1536 Well Med. Binding and High Binding Microplates
p. 84-85

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	781 901	781 904	781 900	781 903	781 906
Well format	384 well	384 well	384 well	384 well	384 well
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	µClear®	µClear®
Colour	clear	white	black	white	black
Binding	non-binding	non-binding	non-binding	non-binding	non-binding
Sterile	-	-	-	-	-
Lid	-	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40	10/40



Cat.-No.	784 904	784 900	782 904	782 900
Well format	384 well	384 well	1536 well	1536 well
Well profile	Small Volume™	Small Volume™	F-bottom	F-bottom
Bottom	solid	solid	solid	solid
Colour	white	black	white	black
Binding	non-binding	non-binding	non-binding	non-binding
Sterile	-	-	-	-
Lid	-	-	-	-
Quantity per bag/case	10/40	10/40	15/60	15/60
Plate design	HiBase	HiBase	HiBase	HiBase

Streptavidin-coated Microplates

Streptavidin-coated solid phases serve as reliable binding surfaces for all types of biotinylated molecules. Numerous ligands can be biotinylated simply and due to the low molecular weight of biotin (244 Da) the functionality of the molecules is normally not impaired.
Thus streptavidin-coated solid phases make it possible to rapidly isolate, determine and quantify components from a reaction mixture. By immobilising the biotinylated substance, it is also possible to reproduce complete reaction chains on a streptavidin solid phase, e.g. enzyme immunoassays, enzyme activity assays, DNA hybridisation techniques, quantification of PCR products and receptor/ligand studies.
The high-purity streptavidin is bound to the plate surface in a uniform and stable layer.
The coefficient of variation from well to well is under 5 % for 96 well microplates and under 8 % for 384 well microplates.

The streptavidin solid phase is treated with an additional blocking step in order to minimise any unspecific binding, therefore, „pre-blocking" of plates is not necessary. The high stability of the coating and the high affinity between streptavidin and biotin enables unusually stringent washing conditions, which have a positive effect on the signal-to-noise ratio of the measurement.

- Shelf-life: 3 years at room temperature
- Pre-blocking: All plates are pre-blocked and ready-to-use

	96 Well Microplate	384 Well Microplate
Streptavidin-coating (in relation to volume)	300 µl	90 µl
Biotin binding capacity*)	> 5 ng/well or > 20 pmol/well	> 1.5 ng/well or > 6 pmol/well

*) Biotin binding capacity determined by competition test

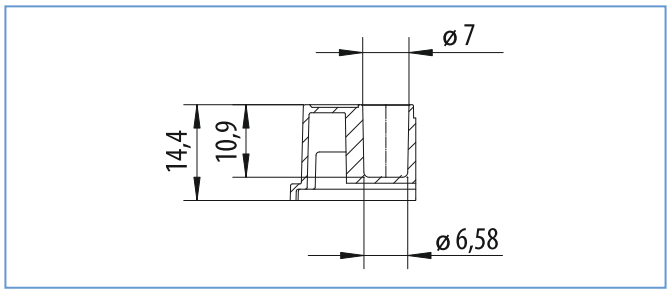
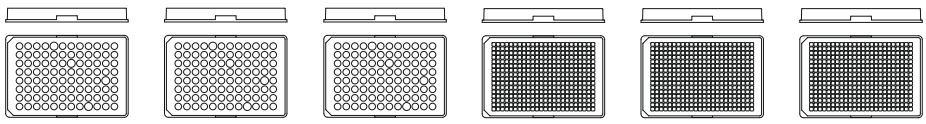


Figure 1:
Well profile: 96 well, C-bottom, polystyrene

96, 384 Well Streptavidin-coated Microplates
solid bottom, clear / white / black

- Further streptavidin-coated microplates are available on request



Cat.-No.	655 990	655 995	655 997	781 990	781 995	781 997
Well format	96 well	96 well	96 well	384 well	384 well	384 well
Well profile	C-bottom	C-bottom	C-bottom	F-bottom	F-bottom	F-bottom
Bottom	solid	solid	solid	solid	solid	solid
Colour	clear	white	black	clear	white	black
Streptavidin-coating	+	+	+	+	+	+
Sterile	-	-	-	-	-	-
Lid	-	-	-	-	-	-
Quantity per bag/case	5/40	5/40	5/40	5/40	5/40	5/40

SensoPlate™

Glass Bottom Microplates

The research of biomolecular processes on the level of single molecules and in volume ranges equivalent to the size of a single bacterium is of immense importance, both in basic research and in industrial high-throughput screening.
The combination of modern confocal optics, new fluorescent dyes, sensitive photomultipliers and improved data processing has revolutionised the technique of fluorescence correlation spectroscopy (FCS) (Fig. 1). Over the past few years this has led to its widespread application, and alongside the technological advances in hardware development, Greiner Bio-One worked hand-in-hand with customers and instrument suppliers to develop the glass bottom microplates. These better satisfy the requirements of fluorescence correlation spectroscopy with regard to optical clarity and deformation when compared to standard polystyrene plates.

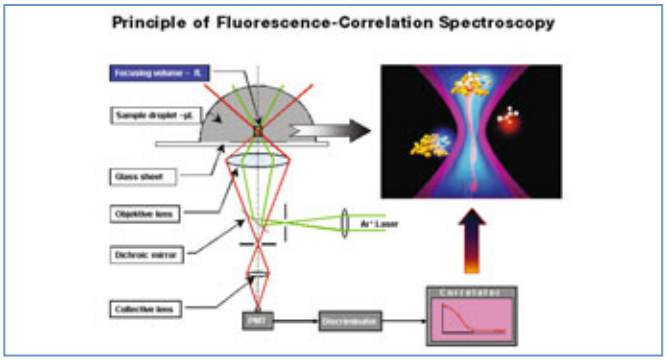


Figure 1:
The principles of fluorescence correlation spectroscopy

The **SensoPlate™** family was developed in a complete product line consisting of 24, 96, 384 and 1536 well glass bottom formats. All plates consist of an optically clear borosilicate glass bottom with a light path of 175 +/- 15 µm and a black polystyrene frame. The glass bottom allows transmission measurements in the wavelength range above 350 nm. For mounting the glass bottom plates an adhesive with the lowest possible autofluorescence is used.

In addition to fluorescence correlation spectroscopy, microscopic applications such as confocal microscopy are a potential area of application for glass bottom microplates. The 175 µm thick glass bottom of the SensoPlate™ is equivalent to the light path of standard coverslips.
The SensoPlate™ family is available sterile with lid but should be tested for their suitability for cell culture before application. For sensitive or transformed cell lines pre-coating with an extracellular matrix such as Poly-Lysine or Collagen is recommended. 4 % formaldehyde is recommended for fixing cells.

The footprint of all glass bottom microplates is conform to the ANSI 1-2004 standard.

In-process controls and constant quality monitoring ensures minimum surface deformation (< 0.1 mm).

The **SensoPlate™ Plus** glass bottom microplates were developed in collaboration with Evotec Technologies GmbH for optical applications in High Content Screening. They are characterised by an improved geometry, which enables interference-free measurements and also microscopy over the whole surface of the bottom of a microplate (Fig. 2, 3 and 4). The short distance of 0.525 mm between the external well bottom (underside) and microplate skirt bottom facilitates changing objectives during microscopy and imaging perimeter wells without hindrance.

! Further information on SensoPlate™ Plus:
→ **Forum No. 18: SCREENSTAR and SensoPlate™ Plus: Microplates for Advanced Microscopy** (F073 787)

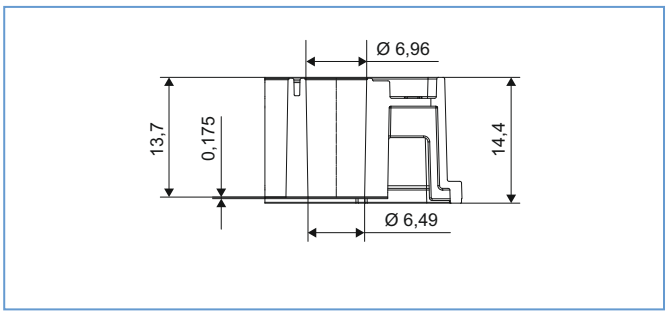


Figure 2:
Well profile: 96 well SensoPlate™ Plus
Total volume: 483 µl
Working volume: 25 – 440 µl

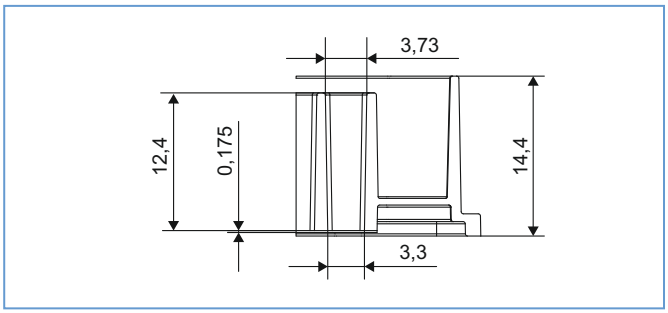


Figure 3:
Well profile: 384 well SensoPlate™ Plus
Total volume: 150 µl
Working volume: 10 – 130 µl

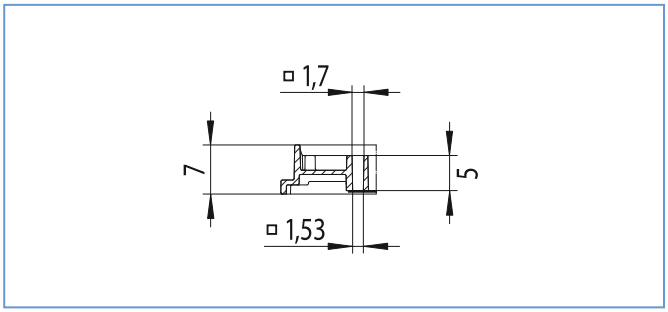
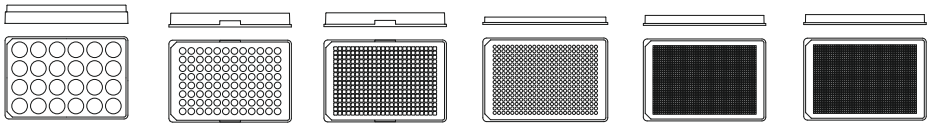


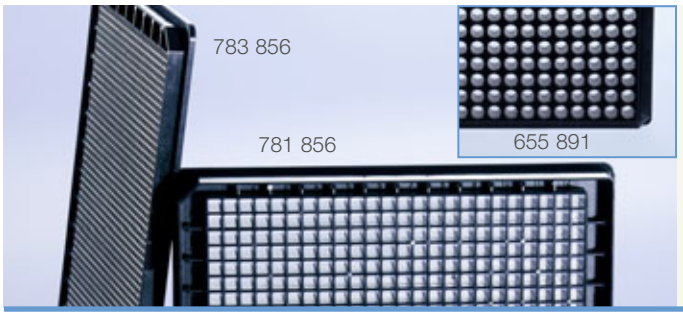
Figure 4:
Well profile: 1536 well SensoPlate™ Plus
Total volume: 13 µl
Working volume: 3 – 10 µl

SensoPlate™ and SensoPlate™ Plus

24, 96, 384, 1536 Well SensoPlate™



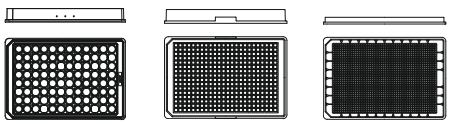
Cat.-No.	662 892	655 892	781 892	788 896	782 892	783 892
Well format	24 well	96 well	384 well	384 well	1536 well	1536 well
Well profile	F-bottom	F-bottom	F-bottom	Small Volume™	F-bottom	F-bottom
Bottom	glass	glass	glass	glass	glass	glass
Colour	black	black	black	black	black	black
Sterile	+	+	+	+	+	+
Lid	+	+	+	-	+	+
Quantity per bag/case	1/12	1/16	1/16	1/16	1/16	1/16
Plate design				LoBase	HiBase	LoBase



96, 384, 1536 Well SensoPlate™ Plus

SCREENSTAR Microplates p. 55

- For High Content Screening applications
- Recessed glass bottom facilitating the use of lenses with low working distance



Cat.-No.	655 891	781 856	783 856
Well format	96 well	384 well	1536 well
Well profile	F-bottom/ chimney well	F-bottom	F-bottom
Bottom	glass	glass	glass
Colour	black	black	black
TC surface treatment	+	-	-
Sterile	+	-	-
Lid	+	-	-
Quantity per bag/case	1/16	1/16	4/16
Plate design		extra LoBase	extra LoBase

New

UV-Star® Microplates

UV/VIS spectroscopy is a classical analytical method for determining the chemical constitution of a substance and its concentration in aqueous solution. UV/VIS spectroscopy is usually conducted in quartz glass cuvettes. However, cuvettes do not provide sufficient throughput when dealing with large amounts of samples, and microplates can be used to speed up work.

Standard polystyrene microplates are only partially suitable for transmission measurements in the UV. Polystyrene absorbs UV especially in the short-wavelength range (< 320 nm). µClear® microplates with a thin polystyrene film base already have much lower background values and can be used up to 340 nm without any problem. The adaptation of the patented µClear® process technology to a new, innovative UV-transparent material has made it possible to produce microplates that extend the transmission range up to 230 nm (Fig. 1, Table 1).

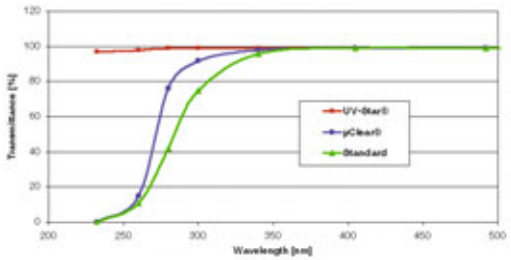


Figure 1:
Light transmission of UV-Star® and µClear® microplates compared with a conventional microplate

For the determination of nucleic acid and protein concentrations at 260 nm or 280 nm without background interference UV-Star® microplates are the ideal alternative to expensive and fragile quartz glass plates or cuvettes. UV-Star® plates are also DMSO-resistant and can be stored at -20 °C without any problem.

	Transparent standard polystyrene microplates with solid bottom	Black/white polystyrene microplates with film bottom (µClear®)	UV-Star® Microplates
Wavelength	For optical measurements above 400 nm	For optical measurements above 340 nm	For optical measurements between 200 and 340 nm

Table 1:
Guideline for the selection of the most suitable microplate for optical measurements

In accordance with Lambert Beer's Law, the amount of absorbed light in a sample is proportional to the concentration and layer thickness (i.e. pathlength) of the substance to be measured (Fig. 2).

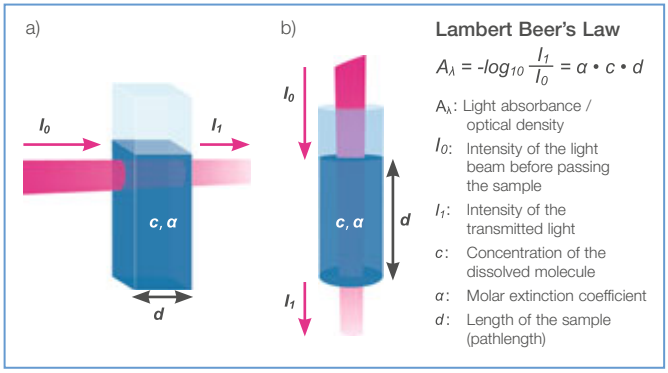


Figure 2:
Lambert Beer's Law.
Fixed pathlength in a cuvette (a) compared to a variable pathlength in a microplate well (b).

In classical spectral photometry with quartz glass cuvettes, measurement is made horizontally with a set pathlength of usually 1 cm. Given a known coefficient of extinction and a standardised distance of travel, the concentration of a substance can be determined without standards, although a large amount of sample is required to completely fill a cuvette.
After measurement, the sample measured is only of limited further use as a result of the risk of contamination. In the case of concentration determinations in microplates, the measurement is made vertically and the layer thickness of the sample to be measured is dependent on the sample volume (Fig. 2).
Even with smaller sample volumes, the resulting layer thicknesses are sufficient for precise measurement. At a constant sample volume, concentrations can be determined with the aid of a calibration curve. In the case of a varying sample volume, the layer thickness can either be calculated mathematically (→ Technical Appendix) or determined optically taking into account the absorption of water in the infrared range [1].

[1] Rieger, A., Hale, P.D.: Übertragung spektralphotometrischer Daten von Küvetten auf Microplatten [Transmission of spectral photometric data from cuvettes to microplates]. LaborPraxis, 05 (2002): 72 – 76

!

Further information on UV/VIS spectroscopy
→ **Application Note "UV/VIS Spectroscopy"** (F073 041)

UV-Star® Microplates have also become increasingly important for sophisticated technologies such as acoustic liquid handling.
→ **Brochure „Performance. Throughput. Reliability. – Intelligent Solutions for Sample Storage"** (F073 917)

Well Profile

Well profile of a standard 96 and 384 well UV-Star® microplate (Fig. 3 and Fig. 4) and well profile of 96 well half area UV-Star® microplate (Fig. 5):

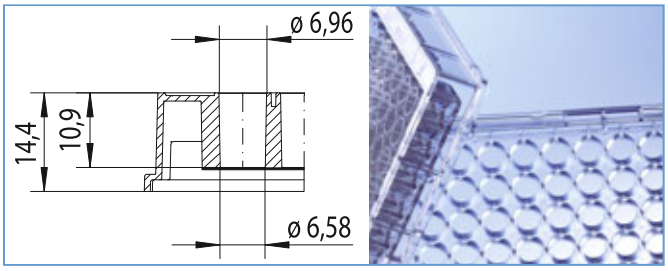


Figure 3:
Well profile: 96 well UV-Star® microplate
Total volume: 392 µl
Working volume: 25 – 340 µl

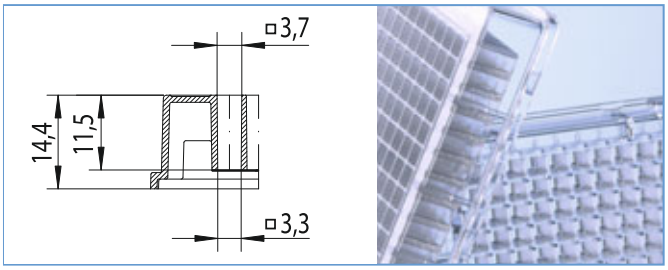


Figure 4:
Well profile: 384 well UV-Star® microplate
Total volume: 131 µl
Working volume: 15 – 110 µl

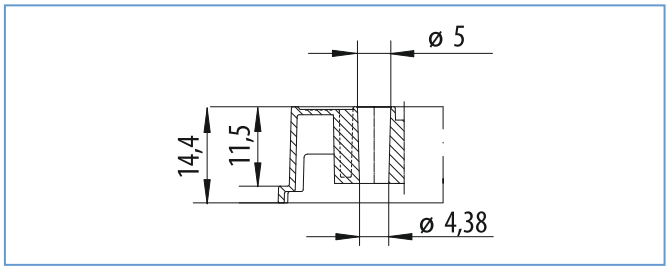


Figure 5:
Well profile: 96 well half area UV-Star® microplate
Total volume: 199 µl
Working volume: 15 – 175 µl
Standardised pathlength (1 cm = 170 µl, 0.5 cm = 80 µl)

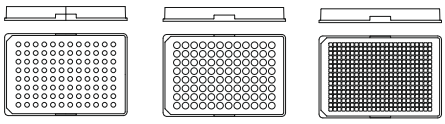
96, 384 Well UV-Star® Microplates

96, 384 Well UV-Star® Microplates

Compound Storage Microplates for Acoustic Liquid Handling p. 93

- Optical window down to 230 nm ideal for nucleic acid determinations at 260 nm/280 nm
- For measurements of protein concentration at 280 nm

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	675 801	655 801	781 801
Well format	96 well	96 well	384 well
Well profile	half area	F-bottom/ chimney well	F-bottom
Bottom	film bottom	film bottom	film bottom
Colour	clear	clear	clear
Sterile	-	-	-
Lid	-	-	-
Quantity per bag/case	10/40	10/40	10/40

3 Immunology / HLA

Immunology

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HLA

Terasaki Plates 113
60 Well Terasaki Plates 113
72 Well Terasaki Plates 113

Immunology

ELISA (Enzyme-Linked Immunosorbent Assay) is probably the most widely used biochemical method in laboratory analysis and diagnostics. Analytes such as peptides, proteins, antibodies and hormones can be detected selectively in low concentrations among a multitude of other substances and be quantified. Additionally, ELISAs are rapid, sensitive, cost-effective and can be performed in a high-throughput manner.

ELISA is used in a variety of different assay types (e.g. direct ELISA, indirect ELISA, sandwich ELISA, competitive ELISA). Nevertheless, all ELISA variants are based on the same principle (Fig. 1), the binding of one assay component – antigen or specific antibody – to a solid surface and the selective interaction between both assay components. Molecules not specifically interacting with the assay component bound to the solid surface are washed away during the assay.

For detection of the interaction the antibody or antigen is labelled or linked to an enzyme (direct ELISA; Fig. 2a). Alternatively, a secondary antibody conjugate can be used (indirect ELISA; Fig. 2b). The assay is processed by adding an enzymatic substrate to produce a measurable signal (colorimetric, fluorescent or luminescent). The strength of the signal indicates the quantity of analytes in the sample.

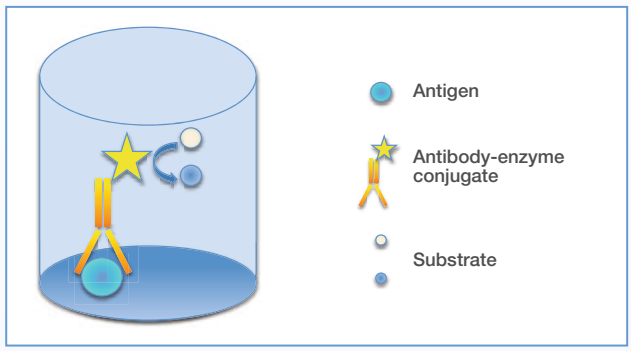


Figure 1: ELISA principle

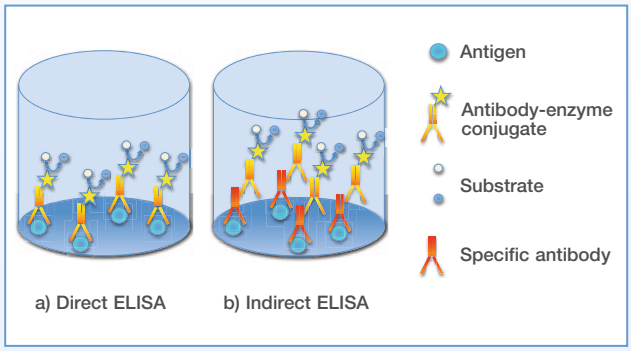


Figure 2: Direct and indirect ELISA

!

Further information on ELISA

→ **Forum No. 9: Microplates for enzyme-linked immunosorbent assays (ELISA)** (F073 004)
→ **Application Note "Insulin ELISA on high binding MICROLON® 600 and CELLSTAR® microplates"** (F073 106)
→ **Application Note "Influence of coating buffer and incubation conditions on ELISA performance"** (F073 118)

INFORMATION

Watch our video
„Step by Step to a Leading High-Quality Product: High-Quality Microplates for Immunological Assays"

Surface Properties and Microplate Colour

A key step in ELISA is the binding of one assay component – antigen or antibody – to the solid surface by passive adsorption. Therefore, the features of this surface are crucial for the performance of the assay. All ELISA microplates from Greiner Bio-One are made out of high-quality virgin polystyrene. The resin is highly transparent and therefore ideally suited for optical measurements. Due to its chemical nature polystyrene is a hydrophobic compound. Hydrophilic groups can be introduced to polystyrene surfaces by physical treatment. Greiner Bio-One offers two surface qualities for ELISA microplates: the hydrophilic **high binding** products and the less hydrophilic **medium binding** products.

Since attachment to a solid surface based upon passive adsorption depends as well on the properties of the molecule to be bound, it is therefore advisable to compare the performance of high binding and medium binding products when developing a new assay.

Beside products made of clear polystyrene for colorimetric measurements, Greiner Bio-One offers a wide variety of black and white ELISA microplates for luminescence and fluorescence measurements. Colour and surface properties can be deduced from the respective brand name of our products (Table 1).

Brand name	Surface property	Colour
MICROLON® 200	Medium binding	clear
MICROLON® 600	High binding	clear
FLUOTRAC™ 200	Medium binding	black
FLUOTRAC™ 600	High binding	black
LUMITRAC™ 200	Medium binding	white
LUMITRAC™ 600	High binding	white

Table 1: Assignment of brand names and properties of ELISA microplates

Quality aspects

We set high standards on the quality of our immunological products, especially on consistency and reproducibility of binding properties. As the raw material has a major influence on the binding properties of the final product, the incoming raw material used for ELISA microplates is routinely monitored for identity and immunological quality. Sample plates are tested with an immunoassay (ELISA, LIA or FIA, depending on their applications) and must fulfil the following criteria:

- For intra-plate homogeneity the coefficient of variation (CV) must not exceed 5 % for colorimetric or 10 % for fluorescence and luminescence assays.
- For all immunological products, to provide constant binding properties, the CV for five tested plates must not exceed 10 %. Additionally, the ratio of new sample plates to reference plates has to be in the range of 100 +/-10 %.

The main criterion for our ELISA microplates is a stable coefficient of variation (CV) from batch to batch which is monitored over a long period (Fig. 3).

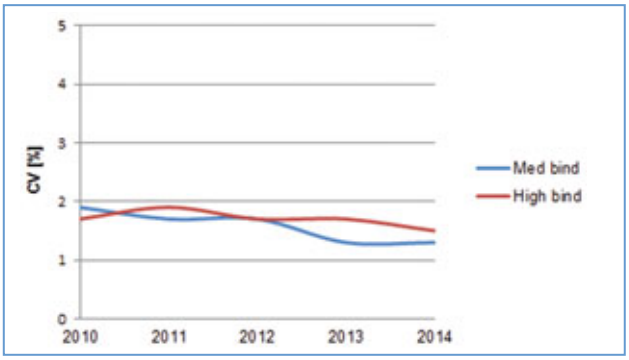


Figure 3: Coefficient of variation (CV) of tested raw material batches from 2010 to 2014 for transparent microplates (med. and high binding)

If the criteria have been met, the raw material batch is approved and released for the production of ELISA microplates.

This raw material batch is also documented on the package labelling of the end product. The package labelling of our ELISA microplates is as follows:

The number of the raw material batch used can be found on the package box, alongside the shelf life, the lot number, a consecutive box number and an in-process control number (Fig. 4).

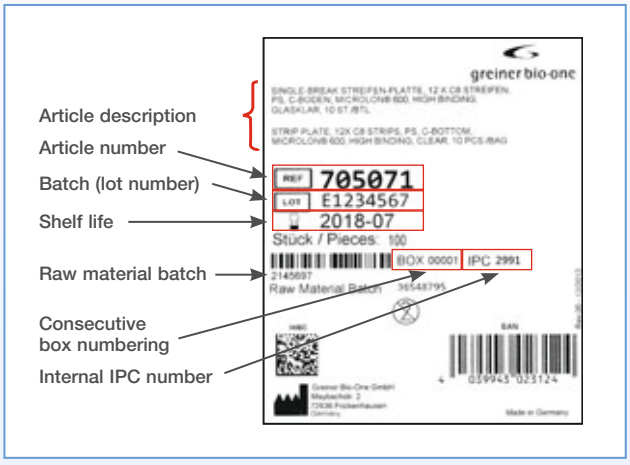


Figure 4: Package labelling of immunological products

96 Well ELISA Microplates

Greiner Bio-One has been manufacturing microplates for diagnostics and immunological research for over 30 years. A wide variety of microplates with different surface treatments and well profiles is available. The microplate footprint is compatible with automated systems.

! Further information on immunological 96 well microplates (FLUOTRAC™ and LUMITRAC™ microplates) and higher format immunological microplates (384 and 1536 well microplates)
→ chapter 2 p. 68, 77-78, 84-85

Well Profile

The well profile is a key feature in a 96 well microplate. Five different well profiles are available:

1. U-Bottom (Fig. 1)

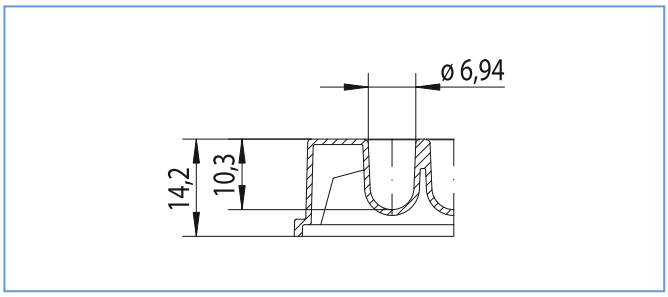


Figure 1:
Well profile: U-bottom
Total volume: 323 µl
Working volume: 40 – 280 µl

2. V-Bottom (Fig. 2)

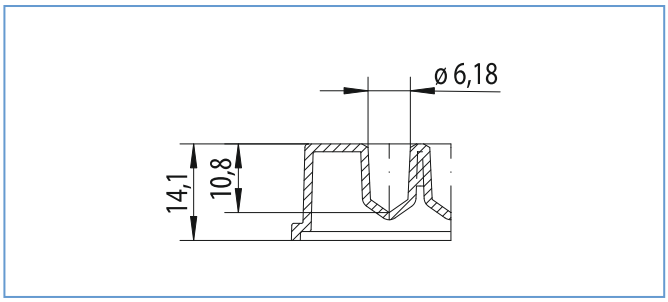


Figure 2:
Well profile: V-bottom
Total volume: 234 µl
Working volume: 40 – 200 µl

3. F-Bottom / Standard (ST) (Fig. 3)

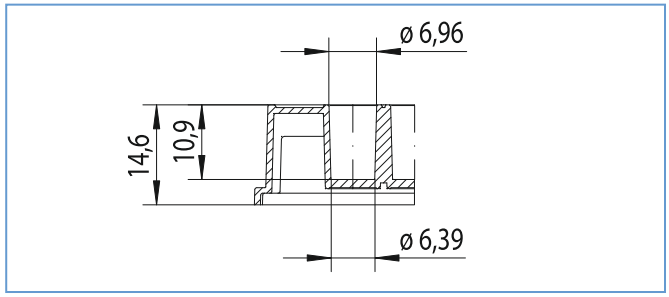


Figure 3:
Well profile: F-bottom / ST
Total volume: 382 µl
Working volume: 25 – 340 µl

4. F-Bottom / Chimney Well (Fig. 4)

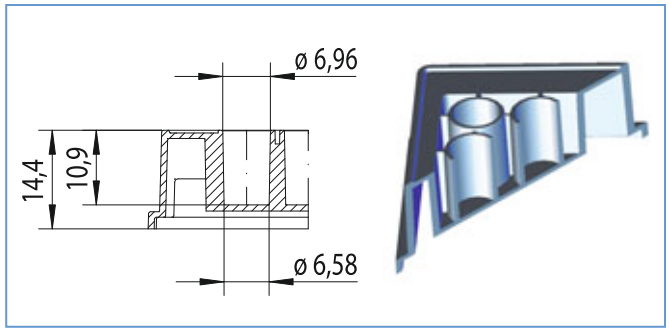


Figure 4:
Well profile: F-bottom / chimney well
Total volume: 392 µl
Working volume: 25 – 340 µl

5. Half Area (Fig. 5)

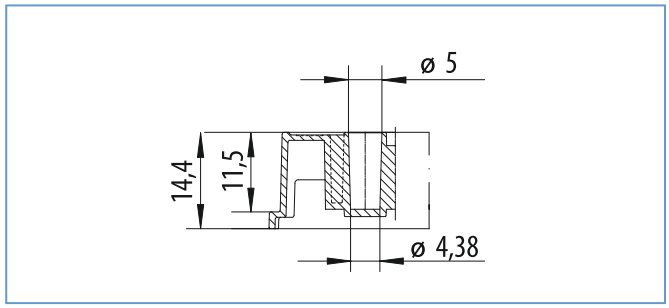
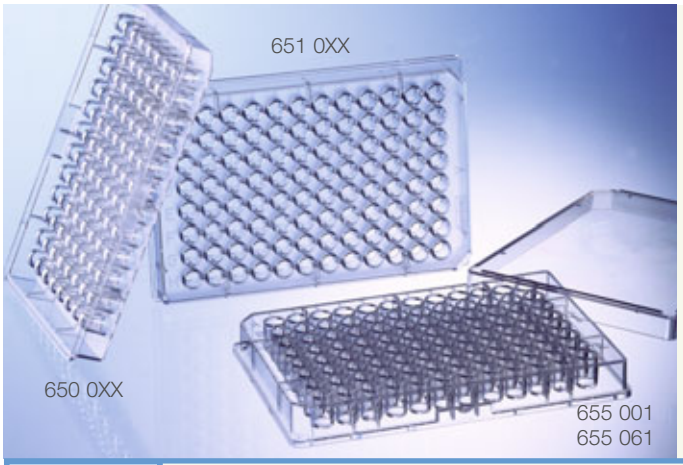


Figure 5:
Well profile: Half area
Total volume: 199 µl
Working volume: 15 – 175 µl

Further information on well profiles → p. 70-71.

! Detailed information about wetted surface and surface/volume ratios
→ Technical Appendix p. 243-244

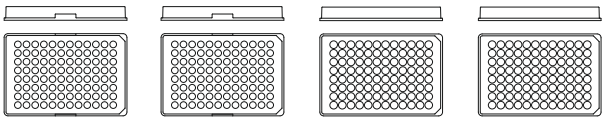


96 Well ELISA Microplates

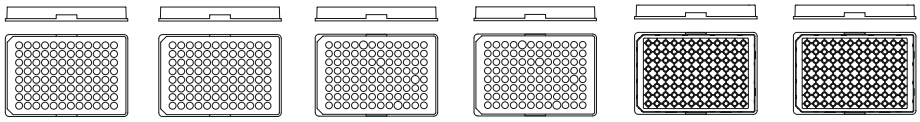
U-Bottom / V-Bottom / F-Bottom Half Area

- Manufactured from crystal clear polystyrene

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	650 001	650 061	651 001	651 061
Well format	96 well	96 well	96 well	96 well
Well profile	U-bottom	U-bottom	V-bottom	V-bottom
Binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	MICROLON® 200 med. binding	MICROLON® 600 high binding
Colour	clear	clear	clear	clear
Lid	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40



Cat.-No.	655 001	655 061	655 080	655 081	675 001	675 061
Well format	96 well	96 well	96 well	96 well	96 well	96 well
Well profile	F-bottom / ST	F-bottom / ST	F-bottom / chimney well	F-bottom / chimney well	half area	half area
Binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	MICROLON® 200 med. binding	MICROLON® 600 high binding
Colour	clear	clear	clear	clear	clear	clear
Lid	-	-	-	-	-	-
Quantity per bag/case	10/40	10/40	10/40	10/40	10/40	10/40

96 Well ELISA Strip Plates

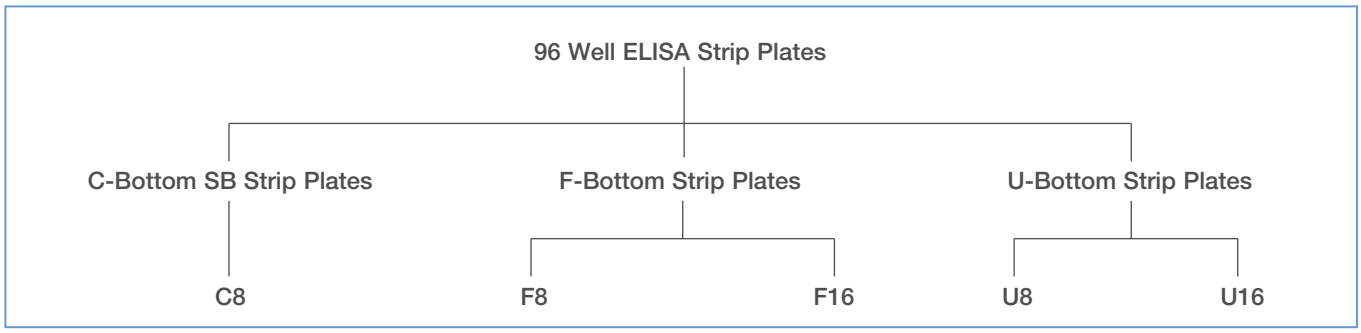


Figure 1:
Overview of the microplates available in strip format

Microplates in strip format offer the advantage of greater flexibility in diagnostics. Individual strips can be removed from the support frame so that the number of tests to be performed can be adjusted to the number of samples, and is not predetermined by the microplate format used. In addition, the individual strips of a microplate can be subjected to a wide variety of different test conditions. An overview of the available microplates in strip format is provided in Fig. 1.

Well Profile

! Detailed information about wetted surface and surface/volume ratios
→ Technical Appendix p. 243-244

1. C-Bottom SB (Single-break) Strip Plates

The “C” describes a flat-bottom profile with rounded corners (Fig. 2). The rounded corners mean that the individual wells can be pipetted without leaving a residue, and the flat bottom still enables precise optical measurements. C-bottom SB strips are supplied as twelve 8 well strips, in a support frame with 96 spaces (12 x 8 matrix). The individual wells can be broken off separately (“single-break” option) and the number of tests performed can thus be precisely adjusted to the number of samples. C-bottom SB strip plates are available in clear polystyrene and additionally with a red, green, blue or yellow colour coding on the well rim.

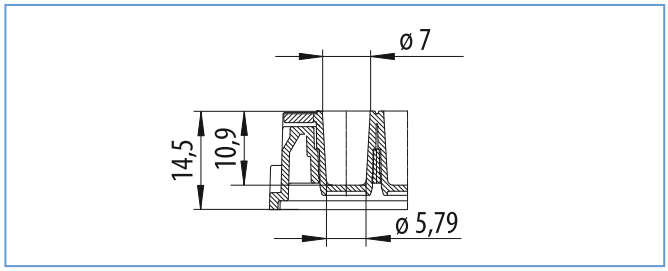


Figure 2:
Well profile: C-bottom
Total volume: 346 µl
Working volume: 20 – 300 µl

2. U-Bottom Strip Plates

96 well strip plates with a round bottom (U-bottom, Fig. 3) are available as both 8 well and 16 well strips. The “U” describes the round bottom form. U-bottom strip plates are ideally suited for agglutination tests.

- No corners, therefore simple and clean pipetting
- Suitable for +/- analyses

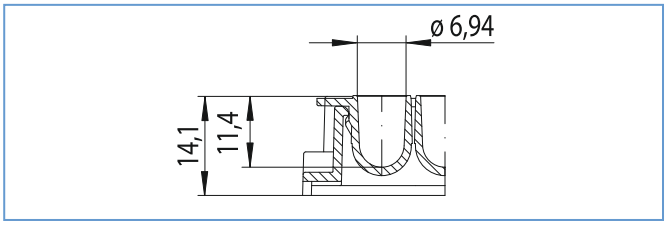


Figure 3:
Well profile: U-bottom
Total volume: 312 µl
Working volume: 50 – 280 µl

3. F-Bottom Strip Plates

96 well strip plates with a flat bottom (F-bottom, Fig. 4) are available

- as 8 well strips
- as 16 well strips

The “F” stands for the flat bottom of the wells. This well type is ideal for the most precise optical measurements as the measuring light beam is not deflected by the well profile. F-bottom strip plates are available in clear polystyrene (MICROLON®) and additionally in black (FLUOTRAC™) and white (LUMITRAC™).

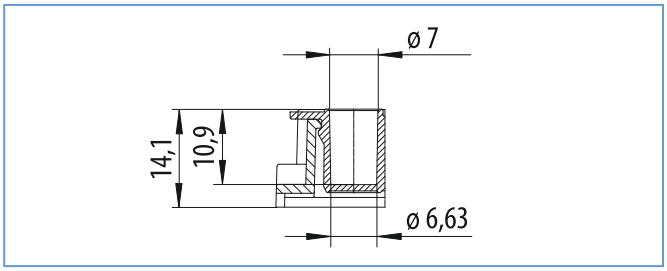
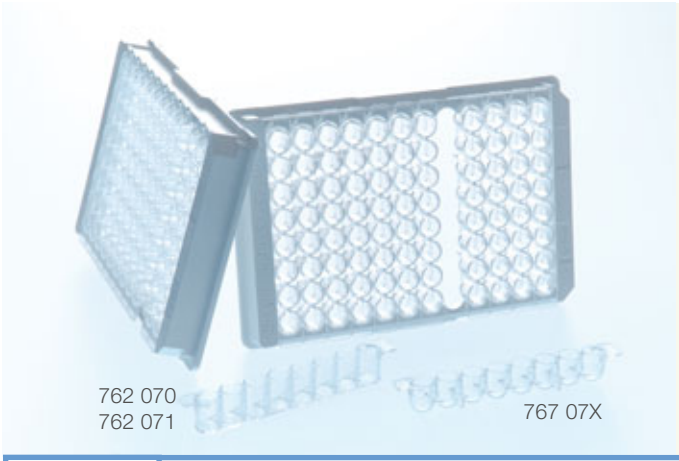


Figure 4:
Well profile: F-bottom
Total volume: 388 µl
Working volume: 20 – 350 µl

U8 and F8 Strip Plates



U8 and F8 Strip Plates
U8 clear
F8 clear / white / black

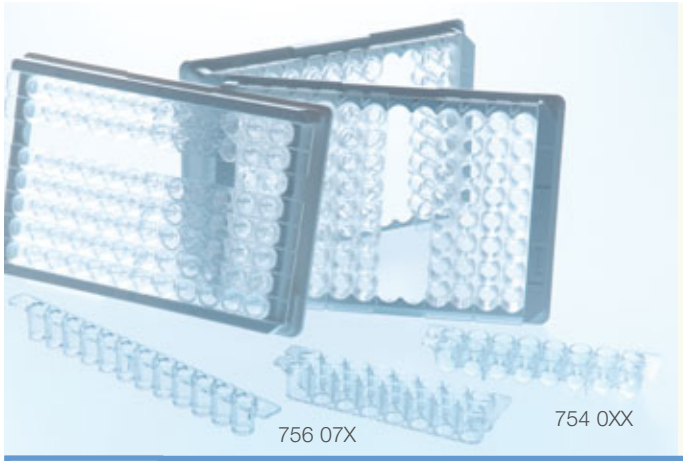
- Strips mounted in frame

Free of detectable DNase, RNase, human DNA
non-pyrogenic

Cat.-No.	767 070	767 071
Description	strip plate	strip plate
Quantity x strip design	12 x U8 strips	12 x U8 strips
Well profile	U-bottom	U-bottom
Binding	MICROLON® 200 med. binding	MICROLON® 600 high binding
Colour of strips	clear	clear
Quantity per bag/case	10/100	10/100

Cat.-No.	762 070	762 071	762 075	762 074	762 076	762 077
Description	strip plate	strip plate	strip plate	strip plate	strip plate	strip plate
Quantity x strip design	12 x F8 strips	12 x F8 strips	12 x F8 strips	12 x F8 strips	12 x F8 strips	12 x F8 strips
Well profile	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom	F-bottom
Binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	LUMITRAC™ 200 med. binding	LUMITRAC™ 600 high binding	FLUOTRAC™ 200 med. binding	FLUOTRAC™ 600 high binding
Colour of strips	clear	clear	white	white	black	black
Quantity per bag/case	10/100	10/100	10/100	10/100	10/100	10/100

F16 and U16 Strip Plates



F16 and U16 Strip Plates

clear

Black and white F16 Strip Plates on request

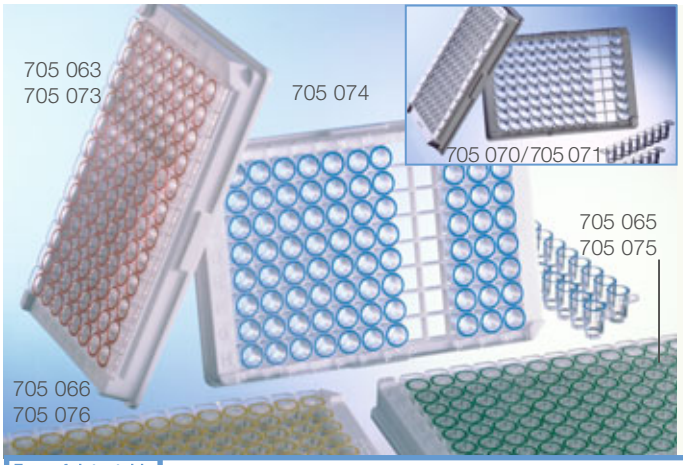
Black and white U16 Strip Plates on request

- Strips mounted in frame

Free of detectable DNase, RNase, human DNA
non-pyrogenic

Cat.-No.	**756 070**	**756 071**	**754 070**	**754 061**
Description	strip plate	strip plate	strip plate	strip plate
Quantity x strip design	6 x F16 strips	6 x F16 strips	6 x U16 strips	6 x U16 strips
Well profile	F-bottom	F-bottom	U-bottom	U-bottom
Binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	MICROLON® 200 med. binding	MICROLON® 600 high binding
Colour of strips	clear	clear	clear	clear
Quantity per bag/case	10/100	10/100	10/100	10/100

Single-break Strip Plates



C8 Single-break Strip Plates

Clear with / without Colour Coding

C8 Single-break Strip Plates without colour coding cell culture treated on request

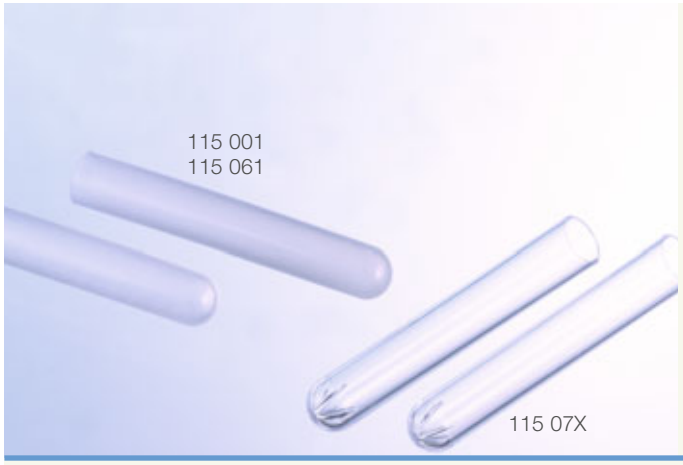
- Strips mounted in frame

Free of detectable DNase, RNase, human DNA
non-pyrogenic

Cat.-No.	705 070	705 071	705 063	705 073	705 074
Description	SB strip plate	SB strip plate	SB strip plate	SB strip plate	SB strip plate
Quantity x strip design	12 x C8 strips	12 x C8 strips	12 x C8 strips	12 x C8 strips	12 x C8 strips
Well profile	C-bottom	C-bottom	C-bottom	C-bottom	C-bottom
Binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	MICROLON® 600 high binding
Colour of strips	clear	clear	clear	clear	clear
Colour coding on the well rim	-	-	red	red	blue
Quantity per bag/case	10/100	10/100	10/100	10/100	10/100

Cat.-No.	705 065	705 075	705 066	705 076
Description	SB strip plate	SB strip plate	SB strip plate	SB strip plate
Quantity x strip design	12 x C8 strips	12 x C8 strips	12 x C8 strips	12 x C8 strips
Well profile	C-bottom	C-bottom	C-bottom	C-bottom
Binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	MICROLON® 200 med. binding	MICROLON® 600 high binding
Colour of strips	clear	clear	clear	clear
Colour coding on the well rim	green	green	yellow	yellow
Quantity per bag/case	10/100	10/100	10/100	10/100

Immuno Tubes



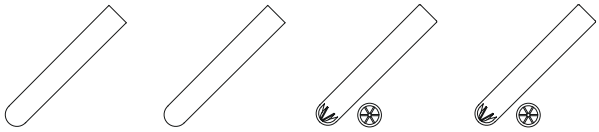
Immuno Tubes

Tubes p. 125-131
Cell Culture Tubes p. 31

- Manufactured from crystal clear polystyrene

Immuno tubes are often used for determining hormone levels, for example TSH (thyroid stimulating hormone). With a length of 75 mm and a diameter of 12 mm with and without a “star”, they are available in both MICROLON® 200 and MICROLON® 600 quality.

The so-called “star” at the bottom of the tubes serves to increase the surface and thus makes it possible to bind larger amounts of antigens or antibodies.



Cat.-No.	115 001	115 061	115 070	115 071
Bottom design	round	round	round with star	round with star
ø [mm] x height [mm]	12 x 75	12 x 75	12 x 75	12 x 75
Volume [ml]	5	5	5	5
Binding	MICROLON® 200 med. binding	MICROLON® 600 high binding	MICROLON® 200 med. binding	MICROLON® 600 high binding
Quantity per bag/case	250/2000	250/2000	250/2000	250/2000

Terasaki Plates

60 Well and 72 Well Terasaki Plates

Terasaki Plates

Microscopic coverslip for Terasaki plates
Cat.-No. 653 081

- Manufactured from crystal clear polystyrene

Terasaki Plates
The human leucocyte antigen (HLA) system is the major histo-compatibility complex (MHC) of humans and is composed of the two polymorphic classes HLA-I (A, B, and C) and HLA-II (DR, DQ, and DP). Basically, four different areas of indication can be distinguished for HLA typing:

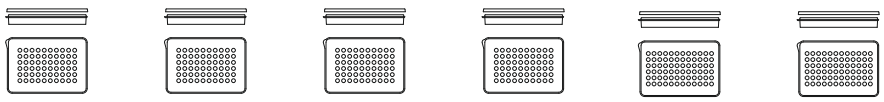
- Transplantation
- Transfusion
- Disease association
- Forensic

The serological determination of HLA proteins of the HLA-A, -B, -C and -DR genetic positions is primarily performed with the complement-dependent microlymphocytotoxicity test (LCT) or Terasaki test, which has been standardised since 1964. The basis for this test method is the cytolysis of the lymphocytes to be tested, which is caused by the antibody-antigen mediated activation of the complement system. Permeabilised lymphocytes are generally stained with chromophores or fluorophores and evaluated microscopically.

Greiner Bio-One Terasaki plates are suitable for all applications for serological determination of HLA antigens. The plates are supplied either with 60 or 72 wells, the plate dimensions stay the same. The individual wells have a volume of 10 µl.

Cat.-No. 659 180 contains one lid per bag.

We provide Terasaki plates with 1 years' stability on the surface treatment.



Cat.-No.	653 180	653 190	659 180	659 190	654 180	769 190
Well format	60 well	60 well	60 well	60 well	72 well	72 well
Working volume per well [µl]	10	10	10	10	10	10
Max. volume per well [µl]	11.5	11.5	11.5	11.5	11.5	11.5
Stackable	-	-	+	+	-	+
TC surface treatment	+	+	+	+	+	+
Lid	+	+	+	+	+	+
Quantity per bag/case	10/270	120*)/480	10/200	150*)/1200	10/270	150*)/1200

*) folding carton

*) folding carton

*) folding carton

4 Microbiology / Bacteriology

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Square Petri Dish 118
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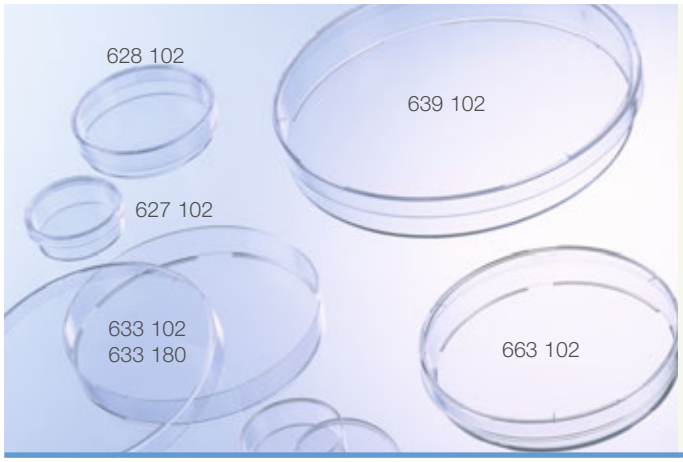
Petri Dishes

Petri dishes are one of the most important products in a bacteriological laboratory and within Greiner Bio-One they are produced in sizes of 35, 60, 94, 100 and 145 mm. Manufactured from high-grade polystyrene the petri dishes have exceptional optical clarity for microscopic analysis as well as heat resistance for use with hot agar. The dishes are available in both vented and non-vented design and the standard round design is supplemented by a square-profile dish and the OneWell Plate™.

To enable parallel testing of a single sample using different agars, divided dishes with two or three compartments are available. The product range is completed by contact dishes and graduated germ count dishes.

! For exact dimensions of our petri dishes, please refer to the product data sheets on our website.

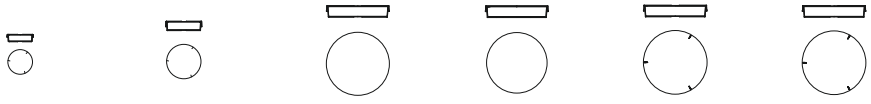
Petri Dishes



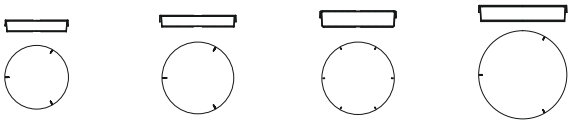
Petri Dishes

Cell Culture Dishes p. 20

- Available in different nominal sizes
- Easy stacking
- Vented for improved gas exchange and non-vented for long incubation period
- Sterilised dishes available on request
- Manufactured from crystal clear polystyrene

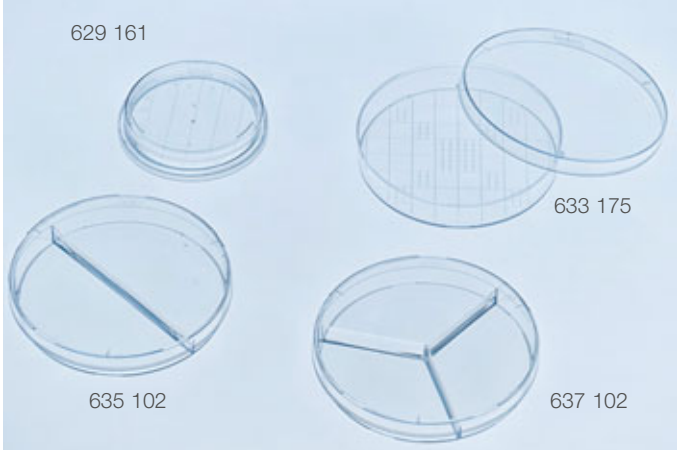


Cat.-No.	627 102	628 102	632 180	632 102	633 185	633 180
Description	petri dish	petri dish	petri dish	petri dish	petri dish	petri dish
Nominal size ø x height [mm]	35 x 10	60 x 15	94 x 16	94 x 16	94 x 15	94 x 16
Vents	+	+	-	-	+	+
Heavy design	-	-	-	+	-	-
Quantity per bag/case	10/740	20/600	20/480	20/480	20/480	20/480



Cat.-No.	633 102	663 102	664 102	639 102
Description	petri dish	petri dish	petri dish	petri dish
Nominal size ø x height [mm]	94 x 16	100 x 15	100 x 20	145 x 20
Vents	+	+	+	+
Heavy design	+	+	+	-
Quantity per bag/case	20/480	20/420	15/360	15/120

Petri Dishes – Special Models



Petri Dishes – Special Models
Germ Count Dish
Contact Dishes

Cell Culture Dishes p. 20

- Manufactured from crystal clear polystyrene

Petri Dishes – Special Models
- Divided dishes for comparative measurements/conditions or different agar systems
- Sterile dishes available on request
- Vented design
- Easy stacking

Germ Count Dish
- Graduation and division into 10 mm squares to enable quick and easy analysis (Fig. 1)
- Vented design
- Easy stacking

Contact Dishes
Contact dishes are used in hygiene monitoring including detection of microorganisms and testing the effectiveness of cleaning and disinfection on flat surfaces by means of contact cultures. Particularly in the pharmaceutical and food industries, analysis of germ count and germ species on surfaces is of major importance to detect and identify possible sources of contamination.

- Sterilised by irradiation
- Vented and non-vented options
- Graduation and division into 10 mm squares to enable quick and easy analyses (Fig. 2)

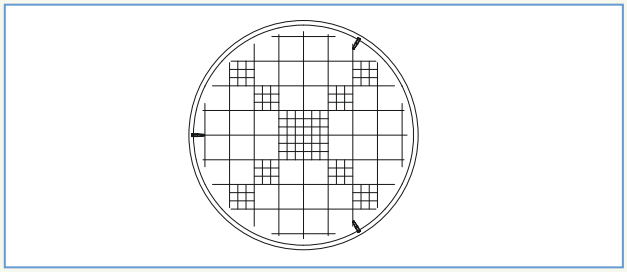


Figure 1:
Graduation of the germ count dish

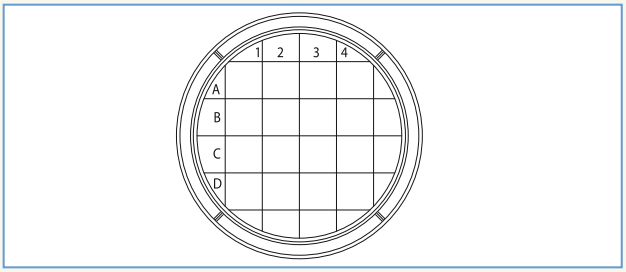
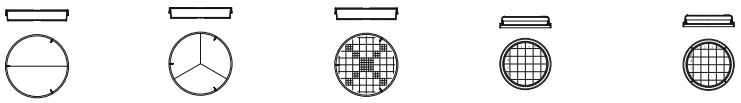
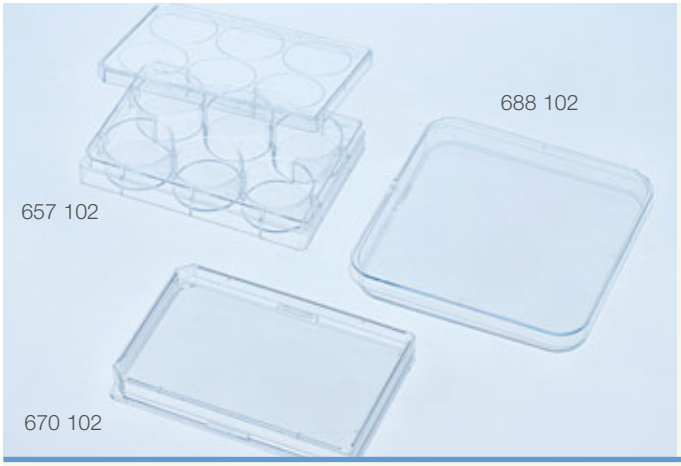


Figure 2:
Graduation of the contact dish



Cat.-No.	635 102	637 102	633 175	629 161	629 180
Description	petri dish	petri dish	germ count dish	contact dish	contact dish
Special feature	2 compartments	3 compartments	graduated	graduated	graduated
Nominal size ø x height [mm]	94 x 15	94 x 15	94 x 16	65 x 15	65 x 15
Volume/well [ml]	20	12	-	-	-
Vents	+	+	+	-	+
Sterile	-	-	-	+	+
Quantity per bag/case	20/480	20/480	20/480	20/600	20/600



Macroplate
Square Petri Dish
CELLSTAR® OneWell Plate™

CELLSTAR® OneWell Plate™ for cell culture applications p. 21

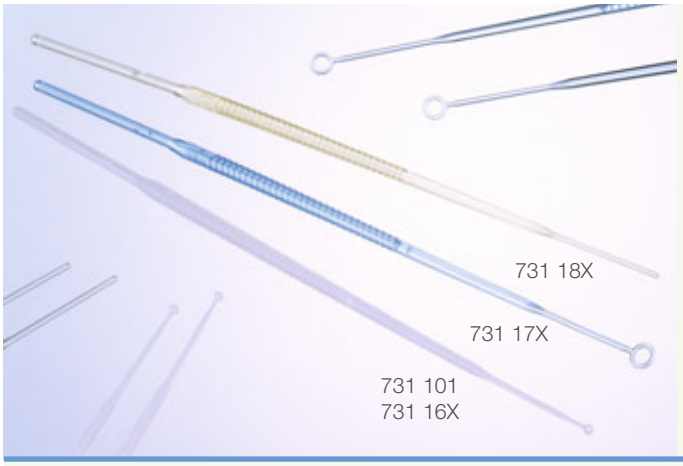
- Manufactured from crystal clear polystyrene

Macroplate
- 35 mm diameter per well
- Practical and space-saving alternative to six standard petri dishes
- Numeric coding allows easier identification of wells

CELLSTAR® OneWell Plate™
Filled with agar, the OneWell Plate™ can be used as an HTS petri dish for the cultivation and screening of bacteria. With an area of 95 cm^2, the OneWell Plate™ also fills the gap between the petri dishes Cat.-No. 664 102 (58 cm^2) and Cat.-No. 639 102 (143 cm^2) / 688 102 (144 cm^2). Handling and the required incubator space are improved compared to a round cell culture dish. Notches on the left side of the plate and the lid ensure a secured lid position. Beside general bacteriological applications, the OneWell Plate™ can be used as a multipurpose liquid container or disposable for the denaturation, hybridisation and washing of membranes (Southern, Northern and Western Blot). For dot blotting and hybridisation the OneWell Plate™ can be used as a membrane holder and storage device.

Cat.-No.	657 102	688 102	670 102
Description	macroplate with lid	petri dish	OneWell Plate™
Special feature	6 well plate	square	microplate format
Length x width [mm]	127.8 x 85.5	120 x 120	127.8 x 85.5
Volume/well [ml]	16	-	-
Vents	+	+	+
Sterile	-	-	-
Quantity per bag/case	2/100	10/240	8/32

Disposable Inoculation Loops / Needles



Disposable Inoculation Loops / Needles

- Sterilised by irradiation
- Needles ideal for picking single colonies
- Flexible loops for easier collection and inoculation
- Colour coding for volume differentiation
- Single and bulk packaging options

Cat.-No.	731 101	731 161	731 165	731 170	731 171	731 175
Description	inoculation loop	inoculation loop	inoculation loop	inoculation loop	inoculation loop	inoculation loop
Volume [µl]	1	1	1	10	10	10
Length [mm]	200	200	200	200	200	200
Colour	white	white	white	blue	blue	blue
Sterile	+	+	+	+	+	+
Quantity per bag/case	50/2000	1/600	10/3000	50/2000	1/600	10/3000

Cat.-No.	731 180	731 181	731 185
Description	inoculation needle	inoculation needle	inoculation needle
Length [mm]	200	200	200
Colour	yellow	yellow	yellow
Sterile	+	+	+
Quantity per bag/case	50/2000	1/600	10/3000

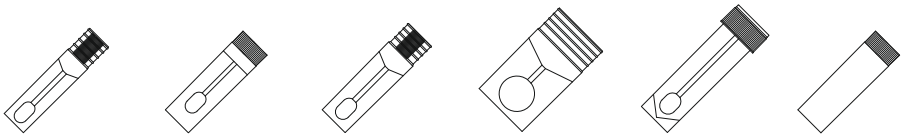
Faeces / Sputum Containers

Faeces / Sputum Containers

Further Containers p. 132-135

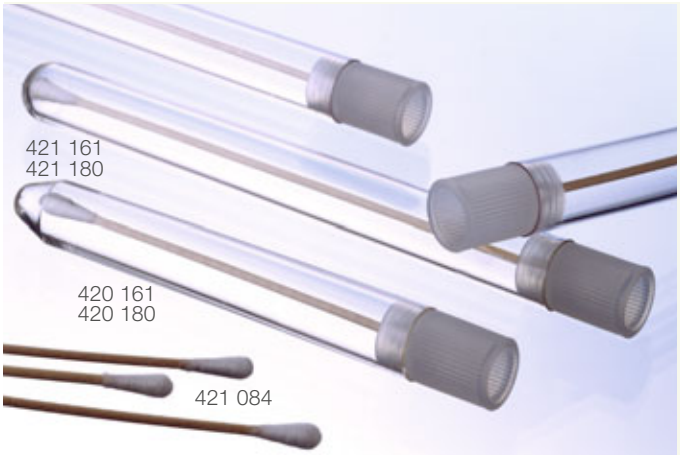
- Available in different sizes
- Range of caps and spoons
- Easy and safe handling
- CE-marked
- Bottom part of containers manufactured from crystal clear polystyrene

CE IVD



Cat.-No.	430 102	431 102	433 102	434 102	443 102	432 102
Description	faeces container	faeces container	faeces container	faeces container	faeces container	sputum container
ø [mm] x height [mm]	18.5 x 61	22 x 63	22 x 63	41 x 57	24 x 90	22 x 63
Volume [ml]	10	16	16	52	30	16
Screw cap with PS spoon	-	-	-	-	+	-
PE push-in cap with PE spoon	+	-	+	+	-	-
PE push-in cap with PS spoon	-	+	-	-	-	cap w/o spoon
Quantity per bag/case	1700	1200	1200	780	400	1200

Swab Tubes / Swabs



Swab Tubes / Swabs

- Suitable for collection and transport of non-human bacteriological and cytological samples
- Sterilised by irradiation
- Swab tubes are made of polystyrene
- Swabs are made of cotton

Swab tubes are suitable for taking non-human bacteriological, serological or cytological samples in veterinary research. They are also useful for hygienic controls in food industry as well as in environmental sampling.

Cat.-No.	420 161	420 180	421 161	421 180	421 084
Description	swab tube	swab tube	swab tube	swab tube	cotton swab
ø [mm] x height [mm]	16 x 110	16 x 110	16 x 152	16 x 152	145
Sterile	+	+	+	+	+
Quantity per bag/case	1300	1/1000	1000	1/700	1/1400

5 Tubes / Beakers

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Tubes with Round Bottom
– Polystyrene Tubes 125
– Polypropylene Tubes 126
– Polyethylene Tubes 127
Tubes with Conical Bottom
– Polystyrene Tubes 127
Tubes with Screw Cap
– Polystyrene Tubes 128
– CELLSTAR® Polypropylene Tubes 129
Tubes with Two-position Vent Stopper
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– Polypropylene Tubes 131

Multipurpose Containers / Beakers 132
Polystyrene Containers for Plant Tissue Culture 132
Drosophila Containers 132
Polystyrene Multipurpose Containers 133
Polypropylene Multipurpose Beakers 135

Closures 136

Tubes / Multipurpose Beakers

The range of Greiner Bio-One tubes and multipurpose containers/beakers is very versatile and meets a wide variety of different demands.

Tubes

Tubes are made of the following materials:

Polystyrene: Is ideally suited for optical measurements as a result of its high clarity.

Polypropylene: Displays high thermal, mechanical and chemical resistance.
It is therefore recommended for the storage of chemical and biological samples.

Polyethylene: Is characterised by high thermal and chemical resistance.

The range of tubes available:
- with round or conical bottom
- with or without skirt
- in sterile or non-sterile version

In addition, it is possible to order appropriate closures in the form of grip stoppers and screw caps. The product range is completed by tubes with a two-position vent stopper. This special stopper enables ventilation or an airtight closure of the tube, depending on the position of the stopper.

Please refer to the Technical Appendix for information on the max. relative centrifugal force (RCF) and chemical and thermal resistance of our tubes.

!

Transportation by aircraft
Polypropylene tubes with Cat.-No. 188 261 / 188 271 / 227 261 / 227 270 meet the pressure requirements for transportation by aircraft. Hydrostatic pressure testing was performed according to the ICAO. IATA DGR guidelines. A certificate of conformity may be provided on request.

Multipurpose Containers / Beakers

Multipurpose containers are supplied in different sizes and the following materials:
- Polystyrene for high clarity
- Polypropylene for high thermal, mechanical and chemical resistance

Depending on the application and requirements, it is possible to choose between different closures (plastic, metal) and labels (without, plain, printed).

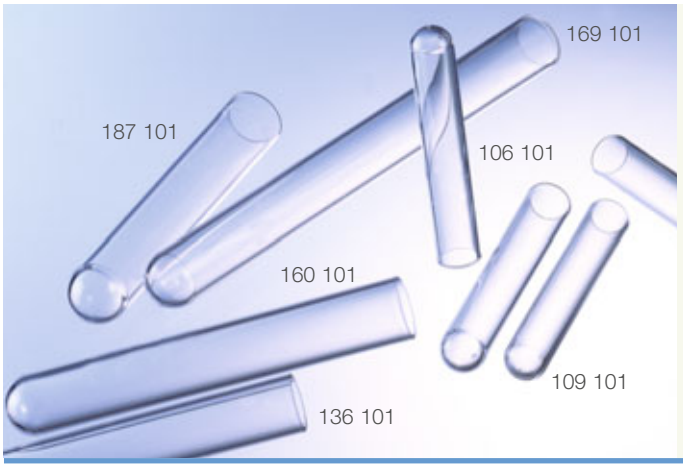
The product range is rounded off by containers for plant tissue culture and *Drosophila melanogaster* breeding.

!

The dimensions and volumes of our tubes and beakers are only nominal sizes. For exact dimensions and volumes, please refer to the product data sheets on our website www.gbo.com/bioscience.

Tubes

Tubes with Round Bottom

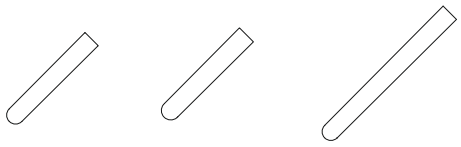


Polystyrene Tubes
Round Bottom

Cell Culture Tubes p. 31
Further Closures p. 136
Overview: See Technical Appendix for max. relative centrifugal force (RCF)

- Appropriate grip stoppers for each tube are listed in the table with their Cat.-No.
- Available in different sizes
- High clarity
- Available in different packaging units

Cat.-No.	103 101	106 101	109 101	112 101	115 101	136 101
ø [mm] x height [mm]	10.5 x 40	11 x 63	11 x 70	12 x 55	12 x 75	14 x 100
Nominal volume [ml]	2	3.5	4	4	5	10
Working volume [ml]	1.5	3	3.5	3	4	8
Sterile	-	-	-	-	-	-
Grip stopper, Cat.-No.	301 321	302 321	302 321	303 321	303 321	307 321
Quantity per bag/case	500/3000	250/3000	240/2880	240/3600	250/2000	1400



Cat.-No.	160 101	187 101	169 101
ø [mm] x height [mm]	16 x 100	17 x 100	16 x 152
Nominal volume [ml]	12	14	20
Working volume [ml]	10.5	12	18
Sterile	-	-	-
Grip stopper, Cat.-No.	310 321	318 321	310 321
Quantity per bag/case	1600	1500	1500

Polypropylene Tubes
Round Bottom

Further Closures p. 136

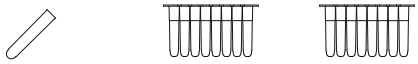
- Polypropylene tubes have particularly good thermal, chemical and mechanical stability
- Material is ideally suited for the storage of samples
- Available in different sizes
- Appropriate grip stoppers for each tube are listed in the table with their Cat.-No.

Cat.-No.	112 201	115 201	160 201	187 201
ø [mm] x height [mm]	12 x 55	12 x 75	16 x 100	17 x 100
Nominal volume [ml]	4	5	12	14
Working volume [ml]	3	4	10	12
Sterile	-	-	-	-
Grip stopper, Cat.-No.	303 321	303 321	310 321	318 321
Quantity per bag/case	240/3600	250/2000	1600	1500

Polypropylene Tubes
Round Bottom
For Storage Box Cat.-No. 975 502

Storage Box p. 89

Strip Cap Cat.-No. 365 270 and 365 261 (sterile)



Cat.-No.	102 201	102 261	102 270
ø [mm] x height [mm]	8.5 x 44	8.5 x 44	8.5 x 44
Nominal volume per tube [ml]	1.3	1.3	1.3
Working volume per tube [ml]	1	1	1
Sterile	-	+	-
Tube chain with attached strip cap	-	+	+
Quantity per bag/case	1000	1000	1000

Polyethylene Tubes
Round Bottom

Further Closures p. 136

- Available in two different sizes
- Polyethylene tubes are characterised by good thermal and chemical resistance


Cat.-No.	112 301	115 301
ø [mm] x height [mm]	12 x 55	12 x 75
Nominal volume [ml]	4	5
Working volume [ml]	3	4
Sterile	-	-
Grip stopper, Cat.-No.	303 321	303 321
Quantity per bag/case	240/3600	250/2000

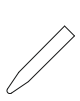
Tubes with Conical Bottom

Polystyrene Tubes
Conical Bottom

Further Closures p. 136

Overview: See Technical Appendix for max. relative centrifugal force (RCF)

- High clarity
- Available in different sizes and with the appropriate grip stopper
- Ideal for small volumes and valuable sample material, since the sample collects at the conical bottom of the tube




Cat.-No.	116 101	172 101
ø [mm] x height [mm]	12 x 75	16.5 x 103
Nominal volume [ml]	4.5	13
Working volume [ml]	3.5	11
Sterile	-	-
Grip stopper, Cat.-No.	303 321	317 321
Quantity per bag/case	60/3600	1500

Tubes with Screw Cap

Polystyrene Tubes

Screw Cap, Conical / Round Bottom

Further Closures p. 136
Cell Culture Tubes p. 31

Tube No. 163 177 also available as polypropylene version with white screw cap (Cat.-No. 163 270)

Overview: See Technical Appendix for max. relative centrifugal force (RCF)



Cat.-No.	164 180	164 161	163 177
Bottom design	conical	conical	conical
ø [mm] x height [mm]	16.8 x 100	16.8 x 100	17 x 100
Nominal volume [ml]	12	12	12
Working volume [ml]	12	12	12
Sterile	-	+	-
Screw cap	-	-	black
Bayonet cap*)	white	blue	-
Graduation	-	-	-
Writing area	-	-	-
Support skirt	+	+	-
Quantity per bag/case	1300	25/1000	900

*) open by a ⅓ turn




Cat.-No.	188 161	188 171	186 161	186 171
Bottom design	conical	conical	round	round
ø [mm] x height [mm]	17 x 120	17 x 120	17 x 120	17 x 120
Nominal volume [ml]	15	15	15	15
Working volume [ml]	14	14	15	15
Sterile	+	+	+	+
Screw cap	blue	blue	blue	blue
Graduation	+	+	-	-
Writing area	+	+	-	-
Support skirt	-	-	-	-
Quantity per bag/case	50*)/500	100/1000	50*)/500	100/1000

*) box

*) box

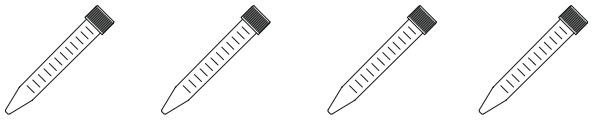
CELLSTAR® Polypropylene Tubes
15 ml, Screw Cap, Conical Bottom

CELLSTAR® CELLreactor™ (polypropylene tube with filter screw cap) p. 32

Overview: See Technical Appendix for max. relative centrifugal force (RCF)

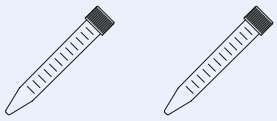
- Optimal mechanical, thermal and chemical stability
- Light protection tubes for light-sensitive materials and reactions
- Available in different packaging units and types

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	188 261	188 271	188 281	188 285
Bottom design	conical	conical	conical	conical
ø [mm] x height [mm]	17 x 120	17 x 120	17 x 120	17 x 120
Nominal volume [ml]	15	15	15	15
Working volume [ml]	14	14	14	14
Sterile	+	+	+	+
Colour	natural	natural	natural	natural
Screw cap	blue	blue	white	white
Graduation	blue	blue	blue	blue
Writing area	white	white	white	white
Support skirt	-	-	-	-
Quantity per bag/case	50*)/500	100/1000	50*)/500	100/700
	*) box		New *) box	New

Light Protection Tubes



Cat.-No.	188 283	188 280
Bottom design	conical	conical
ø [mm] x height [mm]	17 x 120	17 x 120
Nominal volume [ml]	15	15
Working volume [ml]	14	14
Sterile	+	+
Colour	brown	brown
Screw cap	blue	blue
Graduation	blue	blue
Writing area	white	white
Support skirt	-	-
Quantity per bag/case	50*)/500	100/1000
	*) box	

CELLSTAR® Polypropylene Tubes
50 ml, Screw Cap, Conical Bottom

CELLSTAR® CELLreactor™ (polypropylene tube with filter screw cap) p. 32
Overview: See Technical Appendix for max. relative centrifugal force (RCF)

- Optimal mechanical, thermal and chemical stability
- Light protection tubes for light-sensitive materials and reactions
- Available in different packaging units and types

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic


Cat.-No.	210 261	210 270
Bottom design	conical	conical
ø [mm] x height [mm]	30 x 115	30 x 115
Nominal volume [ml]	50	50
Working volume [ml]	50	50
Sterile	+	+
Colour	natural	natural
Screw cap	blue	blue
Graduation	blue	blue
Writing area	white	white
Support skirt	+	+
Quantity per bag/case	25/450	25*)/300

*) box

Light Protection Tubes





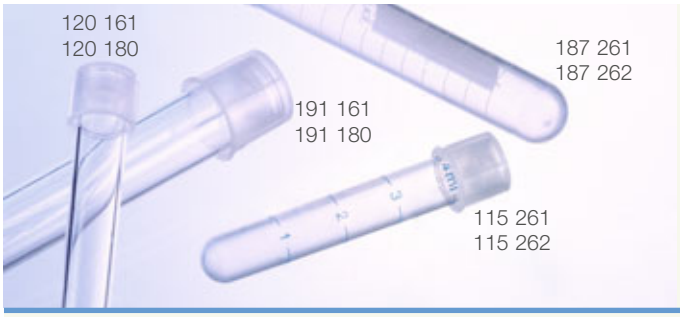

Cat.-No.	227 261	227 270	227 285	227 281	227 283	227 280
Bottom design	conical	conical	conical	conical	conical	conical
ø [mm] x height [mm]	30 x 115	30 x 115	30 x 115	30 x 115	30 x 115	30 x 115
Nominal volume [ml]	50	50	50	50	50	50
Working volume [ml]	50	50	50	50	50	50
Sterile	+	+	+	+	+	+
Colour	natural	natural	natural	natural	brown	brown
Screw cap	blue	blue	white	white	blue	blue
Graduation	blue	blue	blue	blue	blue	blue
Writing area	white	white	white	white	white	white
Support skirt	-	-	-	-	-	-
Quantity per bag/case	20/500	25*)/300	20/500	25*)/300	25*)/300	20/500

*) box

New
*) box

*) box

Tubes with Two-position Vent Stopper



Polystyrene Tubes
Polypropylene Tubes
Two-position Vent Stopper

Cell Culture Tubes p. 31

- Available in different sizes and packaging units
- Also available with graduation

Two-position vent stopper fulfils two functions (Fig. 1):
1. When attached lightly, this enables a uniform ventilation of the tube contents
2. When attached firmly by pressing in the stopper further, an airtight closure of the tube is achieved

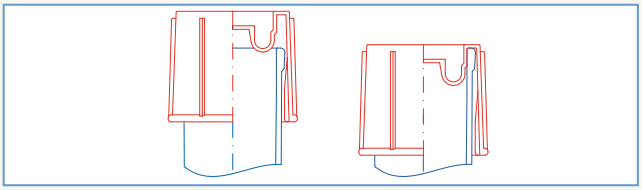


Figure 1:
Cross-section of a two-position vent stopper

Free of detectable DNase, RNase, human DNA
non-pyrogenic

Cat.-No.	120 161	120 180	191 161	191 180
Bottom design	round	round	round	round
Material	polystyrene	polystyrene	polystyrene	polystyrene
ø [mm] x height [mm]	12.4 x 75	12.4 x 75	18 x 95	18 x 95
Nominal volume [ml]	4.5	4.5	14	14
Working volume [ml]	4	4	12.5	12.5
Sterile	+	+	+	+
Two-position vent stopper	+	+	+	+
Graduation	-	-	-	-
Writing area	-	-	-	-
Quantity per bag/case	1/1000	25/2000	1/750	25/1000

Cat.-No.	115 261	115 262	187 261	187 262
Bottom design	round	round	round	round
Material	polypropylene	polypropylene	polypropylene	polypropylene
ø [mm] x height [mm]	12 x 75	12 x 75	18 x 95	18 x 95
Nominal volume [ml]	5	5	14	14
Working volume [ml]	4	4	12	12
Sterile	+	+	+	+
Two-position vent stopper	+	+	+	+
Graduation	+	+	+	+
Writing area	-	-	+	+
Quantity per bag/case	1/1000	25/2000	1/800	25/1000

Multipurpose Containers / Beakers

Polystyrene Containers for Plant Tissue Culture

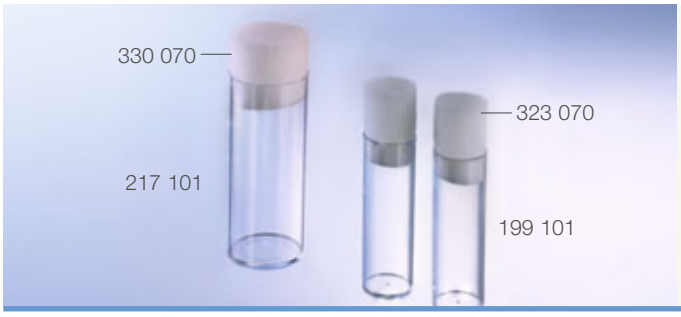
Polystyrene Containers for Plant Tissue Culture

These containers are specially suited for plant tissue culture. The use of a very clear material ensures maximum light transmission and thus rapid and successful growth.

These culture containers are not only suitable for the proliferation of plant tissue cultures but can also be used as transport containers and are available with or without lids.

Cat.-No.	960 177	960 161	967 177	967 169	968 177	968 162
Description	container, bottom part	container	container, bottom part	container	container, bottom part	container
ø [mm] x height [mm]	53 x 100	53 x 100	68 x 66	68 x 66	68 x 100	68 x 100
Nominal volume [ml]	175	175	190	190	330	330
Working volume[ml]	150	150	150	150	300	300
Sterile	-	+	-	+	-	+
Closure, Cat.-No.	960 178	+	967 178	+	967 178	+
Quantity per bag/case	315	4/300	320	1/256	192	1/168

Drosophila Containers



Drosophila Containers

- Ideally suited for the cultivation of *Drosophila melanogaster*
- Choice of different sizes
- Bottom part of container made of polystyrene
- Can be supplied with a separately orderable ceaprene stopper. This stopper is gas-permeable and made of water-repellent material

Cat.-No.	199 101	205 101	217 101	960 177
ø [mm] x height [mm]	22 x 63	27 x 64	36 x 82	53 x 100
Nominal volume [ml]	16	28	68	175
Ceaprene stopper, Cat.-No.	323 070	354 070	330 070	332 070
Quantity per bag/case	1500	1500	605	315

Polystyrene Multipurpose Containers

Polystyrene Multipurpose Containers

Further Containers p. 120

- High clarity
- Can be used universally for academic and non-human medical purposes
- Available in different sizes
- With or without plain or printed label

- All containers are manufactured aseptically in an ISO class 4 clean room environment – irradiated options are also available
- Plastic or metal cap

Cat.-No.	203 170
ø [mm] x height [mm]	24.5 x 40
Nominal volume [ml]	15
Working volume [ml]	10
Label	-
Sterile	-
Snap lid	+
Quantity per bag/case	50/500*)

*) folding carton

Cat.-No.	201 150	201 170	201 152	201 172
ø [mm] x height [mm]	24 x 90	24 x 90	24 x 90	24 x 90
Nominal volume [ml]	30	30	30	30
Working volume [ml]	23	23	23	23
Label	-	-	plain	plain
Sterile	as	st	as	st
Screw cap, white	plastics	plastics	plastics	plastics
Bottom design	conical	conical	conical	conical
Support skirt	+	+	+	+
Quantity per bag/case	400	400	400	400

as = aseptically produced; st = sterile/irradiated

Cat.-No.	219 170	219 175	224 170
ø [mm] x height [mm]	40 x 60	40 x 60	45 x 77
Nominal volume [ml]	60	60	100
Working volume [ml]	50	50	80
Label	-	plain	-
Sterile	as	as	as
Screw cap	plastics (white)	plastics (white)	metal
Quantity per bag/case	30/300	30/300	20/160

Cat.-No.	225 170	225 180	229 170	229 180
ø [mm] x height [mm]	49 x 107	49 x 107	58 x 121	58 x 121
Nominal volume [ml]	175	175	290	290
Working volume [ml]	155	155	260	260
Label	-	plain	-	plain
Sterile	as	as	as	as
Screw cap	metal	metal	metal	metal
Quantity per bag/case	20/120	20/120	12/48	12/48

as = aseptically produced; st = sterile/irradiated

Polypropylene Multipurpose Beakers

Polypropylene Multipurpose Beakers

Further Containers p. 120

Further Closures p. 136

- Can be used universally for academic and non-human medical purposes
- Optimal mechanical, thermal and chemical stability
- Further information about Cat.-No. 724 170 → p. 136

- Multipurpose beakers can be supplied with or without screw cap
- The integrity seal screw cap ensures sterility and intactness of the product. The beaker is unbreakable and resistant against many chemical influences
- Cat.-No., lot number and expiry date are printed on the base of the beaker to provide additional information and improve traceability

Cat.-No.	**724 401**	**724 402**	**724 461**
Description	beaker, bottom part	multipurpose beaker	multipurpose beaker
ø [mm] x height [mm]	61 x 71	61 x 71	61 x 71
Screw cap	Cat.-No. **724 170**	natural	natural
Nominal volume [ml]	100	100	100
Working volume [ml]	100	100	100
Sterile	-	-	+
Graduation	+	+	+
Quantity per bag/case	720	300	300

Closures

Closures

- Two different types of closures:
  – Grip stopper
  – Screw cap
- Closures are made of high-grade polyethylene
- Screw caps available in different colours

Cat.-No.	301 321	302 321	303 321	307 321
Description	grip stopper	grip stopper	grip stopper	grip stopper
Material	PE	PE	PE	PE
Colour	natural	natural	natural	natural
Suitable for tube-ø [mm]	10.5	11	12	14
Suitable for tube Cat.-No.	**103 XXX**	**106 XXX, 109 XXX**	**112 XXX, 115 XXX**	**130 XXX, 136 XXX**
Quantity per bag/case	1000/30000	500/25000	500/20000	100/10000

Cat.-No.	310 321	310 379	317 321	318 321
Description	grip stopper	grip stopper	grip stopper	grip stopper
Material	PE	PE	PE	PE
Colour	natural	white	natural	natural
Suitable for tube-ø [mm]	16	16	16.5	17
Suitable for tube Cat.-No.	**160 XXX, 169 XXX**	**160 XXX**	**175 XXX**	**184 XXX, 187 XXX**
Quantity per bag/case	100/8000	11000	10000	250/8000

Cat.-No.	366 380	366 383	366 384	366 385	366 386	724 170
Description	screw cap	screw cap	screw cap	screw cap	screw cap	screw cap
Gasket	+	+	+	+	+	-
Colour	natural	red	blue	green	yellow	natural
Suitable for tube-ø [mm]	12	12	12	12	12	61
Suitable for tube Cat.-No.	**716 XXX, 717 XXX, 722 XXX**	**716 XXX, 717 XXX, 722 XXX**	**716 XXX, 717 XXX, 722 XXX**	**716 XXX, 717 XXX, 722 XXX**	**716 XXX, 717 XXX, 722 XXX**	**724 4XX**
Quantity per bag/case	500/5000	500/5000	500/5000	500/5000	500/5000	720

Notes

INFORMATION

Interested in other Tubes?

Have a look at chapter 1 of our catalogue

- Cell Culture Tubes (p. 31)
- CELLSTAR® CELLreactor™ (p. 32)

CELLreactor™ Literature:

- Application Note: Cultivation of Suspension and Hybridoma Cells in CELLSTAR® CELLreactor™ Tubes (F073 918)

6 Liquid Handling

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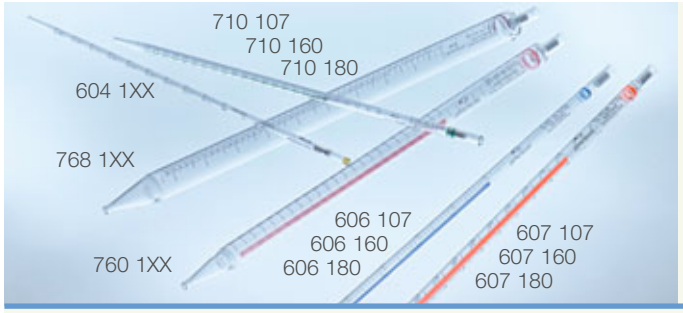
Pipettes

CELLSTAR® Serological Pipettes



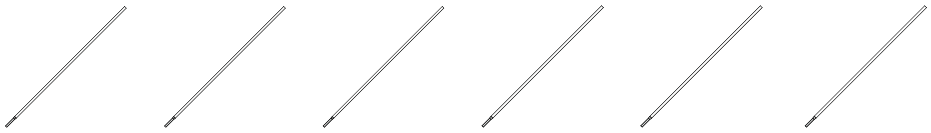
Serological Pipettes 1 to 50 ml

- Sterile
- High optical clarity
- Maximum accuracy
- Drop-free pipetting
- Clear, easily legible graduation
- 5 / 10 / 25 ml pipettes with vertical Schellbach stripe for easier volume identification

- Increased volume from negative graduations
- Pipette colour code according to international standards
- Maximum clarity from high-grade polystyrene
- Lot number and expiry date on each bag
- All pipettes are supplied with a filter for protection against the suction of liquid into the pipetting device
- Short-format pipettes (shorties) permit back-saving work

Packaging options
- Individually wrapped pipettes in **plastic/plastic-packaging** with peel-off function
- **Paper/plastic-packaging** with peel-off function and additional break-through function
- **Plastic bulk packs**

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic



Cat.-No.	604 107	604 181	604 160	710 107	710 180	710 160
Description	1 ml pipette	1 ml pipette	1 ml pipette	2 ml pipette	2 ml pipette	2 ml pipette
Graduation	1/100	1/100	1/100	1/100	1/100	1/100
Sterile	+	+	+	+	+	+
Packaging	bulk	paper/plastic	plastic/plastic	bulk	paper/plastic	plastic/plastic
Quantity per bag/case	25/1000	1/1000	1/1000	25/1000	1/1000	1/1000

Cat.-No.	606 107	606 180	606 160	607 107	607 180	607 160
Description	5 ml pipette	5 ml pipette	5 ml pipette	10 ml pipette	10 ml pipette	10 ml pipette
Graduation	1/10	1/10	1/10	1/10	1/10	1/10
Sterile	+	+	+	+	+	+
Packaging	bulk	paper/plastic	plastic/plastic	bulk	paper/plastic	plastic/plastic
Quantity per bag/case	25/500	1/200	1/200	25/500	1/200	1/200

Cat.-No.	760 107	760 180	760 160	768 180	768 160
Description	25 ml pipette	25 ml pipette	25 ml pipette	50 ml pipette	50 ml pipette
Graduation	2/10	2/10	2/10	1/2	1/2
Sterile	+	+	+	+	+
Packaging	bulk	paper/plastic	plastic/plastic	paper/plastic	plastic/plastic
Quantity per bag/case	25/200	1/200	1/200	1/100	1/100

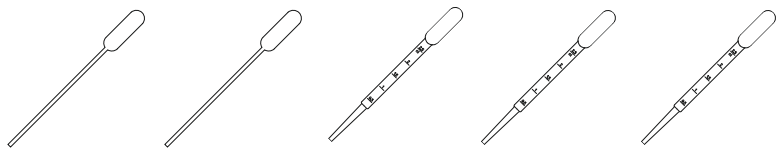
Shorties and Special Models

Cat.-No.	710 183	606 190	607 190
Description	2 ml aspiration	5 ml pipette	10 ml pipette
Special feature	no plug	shorty	shorty
Graduation	-	1/10	2/10
Sterile	+	+	+
Packaging	paper/plastic	plastic	plastic
Quantity per bag/case	1/1000	1/200	1/200

Pasteur / Serum Pipettes

Pasteur / Serum Pipettes

- Ideally suited for the rapid transfer of liquids
- Available sterile or non-sterile



Cat.-No.	700 370	700 361	612 301	612 361	612 362
Description	pasteur pipette	pasteur pipette	serum pipette	serum pipette	serum pipette
Length [mm]	153	153	153	153	153
Working volume [ml]	0.1	0.1	2.5	2.5	2.5
Graduation	-	-	+	+	+
Sterile	-	+	-	+	+
Quantity per bag/case	1500	25/1000	1500	1/800	25/1000

Pipette Tips

1. Pipette Tips from Greiner Bio-One

Pipette tips are a key component in day-to-day life science research and need to be of a high quality to ensure confidence and consistency in pipetting results. Our tips are manufactured from high-grade polypropylene to give the optimum in performance and fit. Additionally, polypropylene has a high breaking strength, is dimensionally stable, heat-resistant up to approx. +140 °C, i.e. is autoclavable, and cold-resistant down to -190 °C. All coloured Greiner Bio-One pipette tips are manufactured exclusively with heavy metal free dyes. Pipette tips from Greiner Bio-One are therefore free of heavy metals.

Versions available are:
- Micro tips (0.5 – 20 µl)
- 200 µl tips (10 – 300 µl)
- 1000 µl tips (100 – 1000 µl)
- Macro tip (5 ml)
- Gel-load tips
- Conductive tips
- Filter tips

2. Choice of Packaging

Bags (Bulk)

In addition to pipette tips in racks, all standard pipette tips without filters are also available bulk-packed in polyethylene bags.
Pipette tips in polyethylene bags are cheapest for the customer but are also the most work-intensive.
It is not possible to autoclave the tips in the bag, as the polyethylene bag is not heat-resistant. However, the tips can be autoclaved in racks. We will be glad to supply you with empty racks (Fig. 1 – Fig. 3). On the following pages, the Cat.-No. of the rack is listed with the corresponding pipette tips.

Racks

A more convenient solution often taking up less bench space are pre-packed tips that minimise any risk of contamination and make for easy “pick up”. Racked tips can be supplied pre-sterilised by irradiation or non-sterile which allows for autoclaving as and when required.

EasyLoad® Racks

EasyLoad® is a simple, time- and space-saving refill system for pipette tips. The refill system also contains EasyLoad® racks (EL-racks) specially developed for this purpose. The modularly constructed EasyLoad® racks are available in three different sizes (for 10 µl, 200 µl and 1000 µl tips) (Fig. 4).
They consist of a polypropylene box with attached lid and a polypropylene insert plate. Users of the EasyLoad® refill system (→ p. 152) will find the insert plate included in the refill unit. The EasyLoad® racks are also particularly well suited for use with multi-channel pipettors, since the individual tips in the rack can be picked up with the same force. For “self-sticking” of tips special EasyLoad® racks with an insert plate can be ordered (Fig. 4). The insert plate can also be ordered separately.

The following standard racks (ST-racks) and EasyLoad® racks (EL-racks) are available (Fig. 1 – Fig. 4):

Figure 1:
White standard rack (ST-rack)

Figure 2:
Yellow standard rack (ST-rack)

Figure 3:
Blue standard rack (ST-rack)

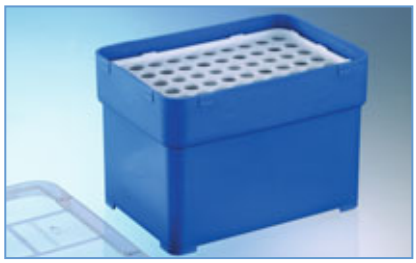


Figure 4:
Blue EasyLoad® rack for 1000 µl tips

3. Quality Assurance

Pipette tips from Greiner Bio-One are manufactured under production conditions certified as conforming to the ISO 9001 standard. They are also tested for conformance with the international standard ISO 8655 (specifically ISO 8655-1, ISO 8655-2 and ISO 8655-6).

Greiner Bio-One exclusively uses carefully inspected raw materials for the production of pipette tips and carries out continual in-process checks as well as laboratory tests to ensure that all tips meet the standards listed above. In addition, the pipette tips are constantly monitored for a precise fit on the commonly used pipettors.

Micro Pipette Tips (0.5 – 20 µl)

Micro pipette tips with a pipetting volume of up to 20 µl are suitable for the precise pipetting of the smallest possible liquid volumes as a result of their small size and thus small dead volume. Greiner Bio-One currently offers three types of micro pipette tips (micro tip P10, micro tip P10 graduated, crystal tip).

Micro Pipette Tips (0.5 – 20 µl)

20 µl Crystal Pipette Tips ideally suited for Eppendorf®

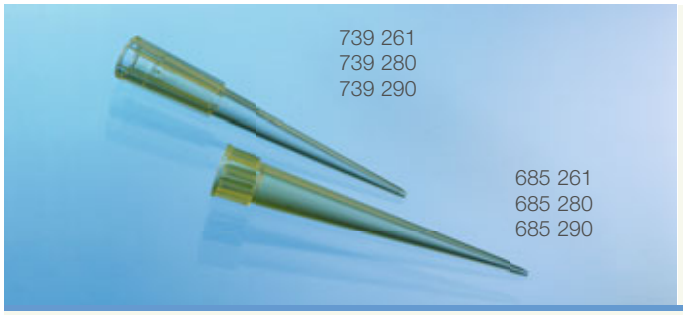
10 µl Micro Pipette Tips ideally suited for Gilson®

Table of Compatibility, Technical Appendix p. 232-233

Cat.-No.	765 290	765 280	765 271
Description	crystal tip	crystal tip	crystal tip
	ideally suited for **Eppendorf®** Reference, Research pro		
Volume [µl]	0.5 – 20	0.5 – 20	0.5 – 20
Colour	natural	natural	natural
Graduation	-	-	-
Sterile	-	-	+
Quantity per packaging unit/case	1000/5000	96/4800	96/4800
Packaging unit	bulk	yellow ST-rack	yellow ST-rack
Matching rack for bulkware tips	Cat.-No. 973 272	-	-

Cat.-No.	771 290	771 287	771 289	771 291	771 280	771 281
Description	P10 standard	P10 standard	P10 standard	P10 graduated	P10 graduated	P10 graduated
	ideally suited for **Gilson®** Pipetman P2, P10, U10					
Volume [µl]	0.5 – 10	0.5 – 10	0.5 – 10	0.5 – 10	0.5 – 10	0.5 – 10
Colour	natural	natural	natural	natural	natural	natural
Graduation	-	-	-	+	+	+
Sterile	-	-	+	-	-	+
Quantity per packaging unit/case	1000/5000	96/4800	96/4800	1000/5000	96/4800	96/4800
Packaging unit	bulk	white ST-rack	white ST-rack	bulk	EL-rack	EL-rack
Matching rack for bulkware tips	Cat.-No. 973 276	-	-	Cat.-No. 941 305	-	-

200 µl Pipette Tips (10 – 250 µl)



100 µl / 200 µl Pipette Tips

100 µl Pipette Tips ideally suited for Eppendorf®

200 µl Pipette Tips ideally suited for Gilson®

Table of Compatibility, Technical Appendix p. 232-233

100 µl Pipette Tip ideally suited for Eppendorf®
This pipette tip is recommended for Eppendorf® pipettors. It has a bevelled edge, which increases pipetting accuracy. The pipette tip can be easily distinguished from the pipette tip recommended for Gilson® pipettors due to its shorter tip collar.

200 µl Pipette Tip ideally suited for Gilson®
This pipette tip was developed for Gilson® pipettors. Its liquid end is bevelled, the contact surface of the pipetted liquids is reduced and the pipetting accuracy increases, since less liquid can remain on the pipette tip.

Cat.-No.	**685 295**	**685 290**	**685 280**	**685 261**
	ideally suited for **Eppendorf®** Reference, Research, Research pro			
Volume [µl]	10 – 100	10 – 100	10 – 100	10 – 100
Colour	natural	yellow	yellow	yellow
Graduation	-	-	-	-
Sterile	-	-	-	+
Quantity per packaging unit/case	500/15000	500/15000	96/4800	96/4800
Packaging unit	bulk	bulk	yellow ST-rack	yellow ST-rack
Matching rack for bulkware tips	Cat.-No. 973 202	Cat.-No. 973 202	-	-

Cat.-No.	**739 290**	**739 280**	**739 261**
	ideally suited for **Gilson®** Pipetman P20, P100, P200, F5, F10, F25, F50, F200, U200		
Volume [µl]	10 – 200	10 – 200	10 – 200
Colour	yellow	yellow	yellow
Graduation	-	-	-
Sterile	-	-	+
Quantity per packaging unit/case	500/15000	96/4800	96/4800
Packaging unit	bulk	yellow ST-rack	yellow ST-rack
Matching rack for bulkware tips	Cat.-No. 973 270	-	-

200 µl / 250 µl Universal Pipette Tips

200 µl Universal Pipette Tips
250 µl Universal Pipette Tips

Table of Compatibility, Technical Appendix p. 232-233

In many research laboratories, pipettors from a variety of different manufacturers are used at the same time, for example Gilson®, Biohit® and Eppendorf®. The universal pipette tip makes it possible to use the same pipette tip for all pipettors and thus simplifies storage, as well as saving time when reordering.

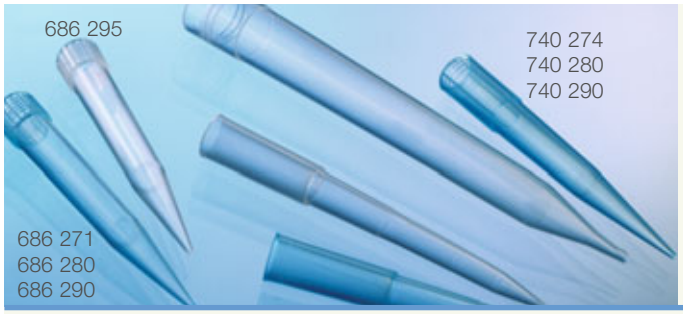
200 µl Universal Pipette Tips
Graduations (10 µl, 50 µl and 100 µl) enable the user to better check the pipetted volume.

Cat.-No.	739 291	739 263	739 264	739 282	739 296	739 265
Description	universal	universal	universal	universal	universal	universal
Suitable for	Biohit®; Brand®; Eppendorf®; Gilson®; Socorex®					
Volume [µl]	10 – 200	10 – 200	10 – 200	10 – 200	10 – 200	10 – 200
Colour	natural	natural	natural	natural	yellow	yellow
Graduation	+	+	+	+	+	+
Sterile	-	-	+	-	-	-
Quantity per packaging unit/case	500/15000	96/4800	96/4800	96/960	500/15000	96/4800
Packaging unit	bulk	yellow ST-rack	yellow ST-rack	EL-rack	bulk	yellow ST-rack
Matching rack for bulkware tips	Cat.-No. 941 315	-	-	-	Cat.-No. 941 315	-

Cat.-No.	739 250	739 255
Description	universal	universal
Suitable for	Brand®; Eppendorf®; Gilson®	
Special feature	-	-
Volume [µl]	10 – 250	10 – 250
Colour	natural	natural
Graduation	+	+
Sterile	-	-
Quantity per packaging unit/case	500/15000	96/3840
Packaging unit	bulk	F-rack
Matching rack for bulkware tips	Cat.-No. 941 315	-

1000 µl Pipette Tips (100 – 1000 µl) and Macro Pipette Tip (5 ml)

Up to 1000 µl Pipette Tips
1000 µl tips have a greater diameter and are longer than 200 µl tips. Many laboratories distinguish between yellow (200 µl) and blue (1000 µl) pipette tips. However, the colour is not sufficient to distinguish them because both pipette tip types are also available clear.



1000 µl Pipette Tips

1000 µl Pipette Tips ideally suited for Eppendorf®
1000 µl Pipette Tips ideally suited for Gilson®

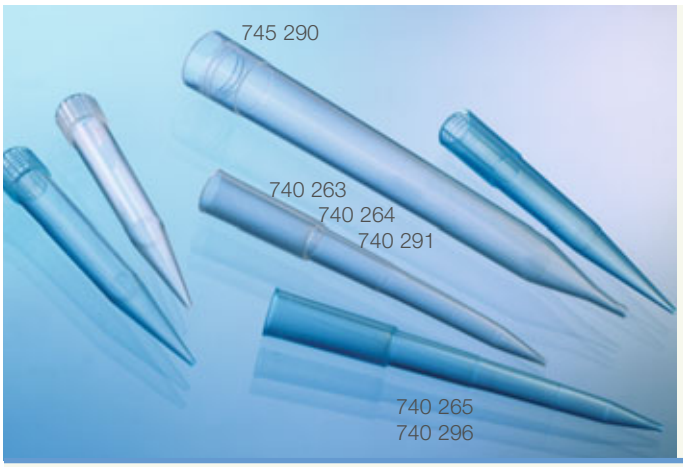
Table of Compatibility, Technical Appendix p. 232-233

1000 µl Tips ideally suited for Eppendorf®
Like the 200 µl tip, the 1000 µl tip recommended for Eppendorf® pipettors is distinguished particularly by a shorter tip collar.
It can be used for volumes between 100 and 1000 µl.

1000 µl Tips ideally suited for Gilson®
This tip is ideally suited for Gilson® pipettors with a volume of 200 – 1000 µl and is only available in blue.

Cat.-No.	**686 295**	**686 290**	**686 280**	**686 271**
	ideally suited for **Eppendorf®** Reference, Research, Research pro			
Volume [µl]	100 – 1000	100 – 1000	100 – 1000	100 – 1000
Colour	natural	blue	blue	blue
Graduation	-	-	-	-
Sterile	-	-	-	+
Quantity per packaging unit/case	250/5000	250/5000	60/2400	60/2400
Packaging unit	bulk	bulk	blue ST-rack	blue ST-rack
Matching rack for bulkware tips	Cat.-No. 974 280	Cat.-No. 974 280	-	-

Cat.-No.	**740 290**	**740 280**	**740 274**
	ideally suited for **Gilson®** Pipetman P1000, F250, F300, F500, F1000, U1000		
Volume [µl]	200 – 1000	200 – 1000	200 – 1000
Colour	blue	blue	blue
Graduation	-	-	-
Sterile	-	-	+
Quantity per packaging unit/case	250/5000	60/2400	60/2400
Packaging unit	bulk	blue ST-rack	blue ST-rack
Matching rack for bulkware tips	Cat.-No. 974 290	-	-



1000 µl Pipette Tips

1000 µl Universal Pipette Tips

Table of Compatibility, Technical Appendix p. 232-233

1000 µl Universal Tips graduated
This pipette tip type is recommended when pipettors from different manufacturers are used at the same time. The graduation makes it easier to check the pipetted volume.

Cat.-No.	740 291	740 263	740 264	740 296	740 265
Description	universal	universal	universal	universal	universal
Suitable for	Brand®; Eppendorf®; Finnpipette®; Gilson®; Socorex®				
Volume [µl]	200 – 1000	200 – 1000	200 – 1000	200 – 1000	200 – 1000
Colour	natural	natural	natural	blue	blue
Graduation	+	+	+	+	+
Sterile	-	-	+	-	-
Quantity per packaging unit/case	250/5000	60/2400	60/2400	250/5000	60/2400
Packaging unit	bulk	EL-rack	EL-rack	bulk	EL-rack
Matching rack for bulkware tips	Cat.-No. 941 325	-	-	Cat.-No. 941 325	-

5 ml Macro Pipette Tip

Cat.-No.	745 290
Description	macro pipette tip
Suitable for	Gilson® P5000
Volume [ml]	1 – 5
Colour	natural
Graduation	-
Sterile	-
Quantity per bag/case	250/2500

Gel-Load Pipette Tips

Gel-Load Pipette Tips

Table of Compatibility, Technical Appendix p. 232-233

- Characterised by an elongated end
- Ideal for numerous molecular biological applications, especially for filling the slots of sequencing, PCR and protein electrophoresis gels

PCR | Free of detectable DNase, RNase, human DNA | non-pyrogenic | non-cytotoxic

Cat.-No.	770 290	770 291
Description	gel-load	gel-load
Suitable for	Anthos®; Biohit®; Brand®; Costar®; Eppendorf®; Finnpipette®; Gilson®; Human®; Moltronic®; Socorex®	
Volume [µl]	10 – 200	10 – 200
Colour	natural	natural
Sterile	-	-
Quantity per packaging unit/case	1000/10000	96/3840
Packaging unit	bulk	blue ST-rack

Cat.-No.	775 288
Description	gel-load filter tip
Special feature	low-seated filter
Suitable for	Brand®; Eppendorf®; Gilson®; Socorex®
Volume [µl]	20
Colour	natural
Graduation	-
Sterile	+
Quantity per packaging unit/case	96/960
Packaging unit	F-rack

Conductive Pipette Tips

Conductive Pipette Tips

Conductive tips are used to prevent carryover in automated pipetting robots. The addition of graphite to the raw material polypropylene makes the pipette tips electrically conductive.

By measuring electric currents, the filling level can be determined in sample and reagent containers, so that the depth of immersion of the tip can be adjusted to the filling level.

Cat.-No.	**686 296**
Suitable for	-
Volume [µl]	200 – 1000
Filter	-
Colour	black
Sterile	-
Quantity per packaging unit/case	250/5000
Packaging unit	bulk
Matching rack for bulkware tips	Cat.-No. 974 280

Filter Tips

Filter Tips

Table of Compatibility, Technical Appendix p. 232-233

Pipette tips with filter inserts prevent contamination with liquids and aerosols during the pipetting process.
In combination with conventional pipettors, Greiner Bio-One filter tips prevent the aspiration of particles into the interior of the pipettor. This minimises the danger of unwanted cross-contamination. The special ultra-micro filter made of hydrophobic polyethylene has a pore size of approx. 10 microns and acts as a reliable barrier against the transfer of aerosols into the shaft of the pipettor.
Greiner Bio-One filter tips:

- Are recommended for work with DNA and RNA, and when handling radioactive material
- Are available in the volume ranges 0.5 µl to 1000 µl
- Can be used with all standard pipettors
- Are free of detectable DNase / RNase and are **sterilised by irradiation**
- Are available in boxes of 96 pieces (Fig. 5) or 60 pieces in the case of 1000 µl tips
- Produced according to ISO 8655

Micro Filter Tips 0.5 – 20 µl
Micro tips with a pipetting volume of up to 20 µl are suitable for the precise pipetting of the smallest possible liquid volumes as a result of their small size and thus small dead volume.

Filter Tips 10 – 200 µl
These tips can be used for pipetting volumes of 10 – 200 µl.

Filter Tips 200 – 1000 µl
These tips can be used for pipetting volumes of 200 – 1000 µl.

Figure 5:
Filter tip rack (F-rack)

PCR | Free of detectable DNase, RNase, human DNA | non-pyrogenic | non-cytotoxic

0.5 – 20 µl



Cat.-No.	**765 288**	**771 288**	**774 288**
Description	micro crystal tip	micro tip P10	standard tip
Ideally suited for	**Eppendorf®**	**Gilson®**	universal
	Eppendorf® Reference Eppendorf® Research Eppendorf® Research pro	Gilson® Pipetman P2, P10, U10	Brand®; Biohit®; Eppendorf®; Gilson®; Socorex®
Volume [µl]	10	10	20
Colour	natural	natural	natural
Graduation	-	-	-
Sterile	+	+	+
Quantity per packaging unit/case	96/960	96/960	96/960
Packaging unit	F-rack	F-rack	F-rack

10 – 200 µl


Cat.-No.	**772 288**	**739 288**
Description	filter tip	universal filter tip
Ideally suited for	universal	universal
Suitable for	Brand®; Biohit®; Eppendorf®; Gilson®; Socorex®	Brand®; Biohit®; Eppendorf®; Gilson®
Volume [µl]	100	200
Colour	natural	natural
Graduation	-	+
Sterile	+	+
Quantity per packaging unit/case	96/960	96/960
Packaging unit	F-rack	F-rack

100 – 1000 µl


Cat.-No.	**750 288**	**740 288**
Description	filter tip	universal filter tip
Ideally suited for	**Eppendorf®**	universal
Suitable for	Biohit® Finnpipette®; Gilson®; Socorex®	Finnpipette®; Gilson®
Volume [µl]	1000	1000
Colour	natural	natural
Graduation	-	-
Sterile	+	+
Quantity per packaging unit/case	60/600	60/600
Packaging unit	F-rack	F-rack

EasyLoad®

EasyLoad®

- Autoclavable EasyLoad® racks
- Sterile and non-sterile option
- Racks are stackable
- Colour-coded boxes
- Positioning guides make it easier to place the EasyLoad® refill units on the racks

EasyLoad® is a simple, time- and space-saving refill system for standard pipette tips.
- EasyLoad® 10 (micro 10 µl, graduated)
- EasyLoad® 200 (universal 200 µl, thin-walled, graduated)
- EasyLoad® 1000 (universal 1000 µl, thin-walled, graduated)

! The design of the rack's interior increases stability during autoclaving and when pipette tips are being used with multi-channel pipettors.

Cat.-No.	741 015	741 020
Description	EasyLoad® 10	EasyLoad® 10
Volume [µl]	10	10
Suitable for single-channel pipettors	Gilson®	Gilson®
Colour	natural	natural
Graduation	+	+
Sterile	-	+
Quantity per refill box/case	960/5760	960/5760
Matching EasyLoad® rack, Cat.-No.	941 300	941 300

Cat.-No.	741 000	741 061	741 065	741 070	741 010
Description	EasyLoad® 200	EasyLoad® 200	EasyLoad® 200	EasyLoad® 200	EasyLoad® 200, starter kit
Volume [µl]	200	200	200	200	200
Suitable for single-channel pipettors	Brand®; Eppendorf®; Finnpipette®; Gilson®; Socorex®				
Suitable for multi-channel pipettors	Brand®; Gilson®; Eppendorf®; Socorex®				
Colour	natural	natural	yellow	yellow	yellow
Graduation	+	+	+	+	+
Sterile	-	+	-	+	-
Quantity per refill box/case	960/5760	960/5760	960/5760	960/5760	2 boxes EasyLoad® 200, 10 EasyLoad® 200 racks
Matching EasyLoad® rack, Cat.-No.	941 310	941 310	941 310	941 310	

Cat.-No.	741 035	741 040	741 045	741 050
Description	EasyLoad® 1000	EasyLoad® 1000	EasyLoad® 1000	EasyLoad® 1000
Volume [µl]	100 – 1000	100 – 1000	100 – 1000	100 – 1000
Suitable for single-channel pipettors	Brand®; Eppendorf®; Finnpipette®; Gilson®; Socorex®			
Colour	natural	natural	blue	blue
Graduation	+	+	+	+
Sterile	-	+	-	+
Quantity per refill box/case	360/2160	360/2160	360/2160	360/2160
Matching EasyLoad® rack, Cat.-No.	941 320	941 320	941 320	941 320

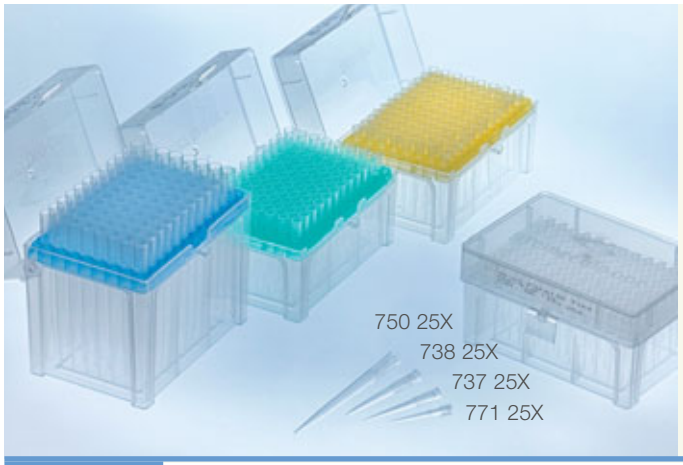
Sapphire Pipette & Filter Tips

The Sapphire product family comprises standard, filter and low retention tips manufactured from virgin materials. All tips are transparent, graduated, and allow precise and comfortable pipetting with maximal recovery.

New: Visual Identification System
The boxes are transparent with coloured tip inserts based on the volume of the relevant tip:

10 µl / 20 µl tips	→ translucent insert
100 µl / 200 µl tips	→ yellow insert
300 µl tips	→ green insert
1250 µl tips	→ blue insert

Sapphire Pipette Tips



Pipette Tips

10 µl / 200 µl / 300 µl / 1250 µl

Racks can be ordered separately

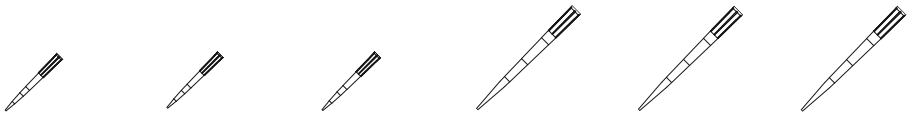
Table of Compatibility, Technical Appendix p. 234-235

- Graduation for perfect visual control of the liquid transfer
- Thin-walled top of the tips for reliable fit and optimal seal
- Tips and racks are autoclavable
- Extended 10 µl tip for better recovery of small sample volumes
- User-friendly and stackable racks
- **New:** Coloured box inserts for easy volume identification

Free of detectable DNase, RNase, human DNA
non-pyrogenic

	771 254	771 257	771 250	737 254	737 257
Cat.-No.	771 254	771 257	771 250	737 254	737 257
Volume [µl]	10	10	10	200	200
Colour	natural	natural	natural	natural	natural
Graduation	+	+	+	+	+
Sterile	-	-	-	-	-
Quantity per packaging unit/case	96/4800	96/4800	1000/10000	96/4800	96/4800
Packaging unit	rack	refill unit	bulk	rack	refill unit
Matching rack	-	Cat.-No. 970 310	Cat.-No. 970 310	-	Cat.-No. 970 320

New | New



	738 254	738 257	738 250	750 254	750 257	750 250
Cat.-No.	738 254	738 257	738 250	750 254	750 257	750 250
Volume [µl]	300	300	300	1250	1250	1250
Colour	natural	natural	natural	natural	natural	natural
Graduation	+	+	+	+	+	+
Sterile	-	-	-	-	-	-
Quantity per packaging unit/case	96/4800	96/4800	1000/10000	96/3840	96/3840	768/7680
Packaging unit	rack	refill unit	bulk	rack	refill unit	bulk
Matching rack	-	Cat.-No. 970 330	Cat.-No. 970 330	-	Cat.-No. 970 350	Cat.-No. 970 350

Sapphire Low Retention Pipette Tips

The Sapphire Low Retention Pipette Tips feature specially optimised surface properties for maximum precision. Because no liquid remains in the tip, pipetting is virtually residue-free. This boosts precision and the usable volume. It also prevents the wasting of valuable sample material.

Low Retention Pipette Tips

10 µl / 200 µl / 300 µl / 1250 µl

Racks can be ordered separately

Table of Compatibility, Technical Appendix p. 234-235

- Low retention surface properties for high recovery rate and maximum precision
- Graduation for perfect visual control of the liquid transfer
- Thin-walled top of the tips for reliable fit and optimal seal
- Tips and racks are autoclavable
- Extended 10 µl tip for better recovery of small sample volumes
- User-friendly and stackable racks
- **New:** Coloured box inserts for easy volume identification

Free of detectable DNase, RNase, human DNA
non-pyrogenic

Cat.-No.	771 255	771 258	737 255	737 258
Volume [µl]	10	10	200	200
Special feature	low retention	low retention	low retention	low retention
Colour	natural	natural	natural	natural
Graduation	+	+	+	+
Sterile	-	-	-	-
Quantity per packaging unit/case	96/4800	96/4800	96/4800	96/4800
Packaging unit	rack	refill unit	rack	refill unit
Matching rack	-	Cat.-No. 970 310	-	Cat.-No. 970 320

New New

Cat.-No.	738 255	738 258	750 255	750 258
Volume [µl]	300	300	1250	1250
Special feature	low retention	low retention	low retention	low retention
Colour	natural	natural	natural	natural
Graduation	+	+	+	+
Sterile	-	-	-	-
Quantity per packaging unit/case	96/4800	96/4800	96/3840	96/3840
Packaging unit	rack	refill unit	rack	refill unit
Matching rack	-	Cat.-No. 970 330	-	Cat.-No. 970 350

Sapphire Filter Tips

Filter Tips
Low Retention Filter Tips
10 µl / 20 µl / 100 µl / 300 µl / 1250 µl

Racks can be ordered separately

Table of Compatibility, Technical Appendix p. 234-235

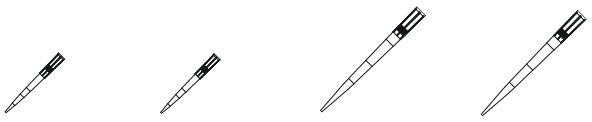
- Prevent contamination with liquids and aerosols during pipetting
- Are recommended for work with DNA, RNA, and when handling radioactive material
- Graduation for perfect visual control of the liquid transfer
- Thin-walled top of the tips for reliable fit and optimal seal
- Low retention tips for high recovery rate and maximum precision
- **New:** Coloured box inserts for easy volume identification

Free of detectable DNase, RNase, human DNA
non-pyrogenic

Filter Tips

Cat.-No.	771 261	771 260	773 261	737 261
Volume [µl]	10	10	20	100
Colour	natural	natural	natural	natural
Graduation	+	+	+	+
Sterile	+	+	+	+
Quantity per packaging unit/case	96/960	1000	96/960	96/960
Packaging unit	rack	bulk	rack	rack
Matching rack	-	Cat.-No. 970 310	-	-

New



Cat.-No.	738 261	738 260	750 261	750 260
Volume [µl]	300	300	1250	1250
Colour	natural	natural	natural	natural
Graduation	+	+	+	+
Sterile	+	+	+	+
Quantity per packaging unit/case	96/960	1000	96/768	768
Packaging unit	rack	bulk	rack	bulk
Matching rack	-	Cat.-No. 970 330	-	Cat.-No. 970 350

Low Retention Filter Tips

Cat.-No.	**771 265**	**773 265**	**738 265**	**750 265**
Volume [µl]	10	20	300	1250
Special feature	low retention	low retention	low retention	low retention
Colour	natural	natural	natural	natural
Graduation	+	+	+	+
Sterile	+	+	+	+
Quantity per packaging unit/case	96/960	96/960	96/960	96/768
Packaging unit	rack	rack	rack	rack

7 Molecular Biology

Thin Wall PCR Tubes **160**
PCR Tubes 160
PCR 8-tube Strips 161
PCR 8-cap Strips 161

PCR Microplates **162**
96 Well Polypropylene Microplates 162
384 Well Polypropylene Microplates 162

Thin Wall PCR Tubes

PCR Tubes

The PCR range has a product for all applications, including 0.2 ml and 0.5 ml tubes with flat caps, PCR tube strips with 8 tubes or as individual reaction tubes, as well as PCR microplates.

The thin wall construction optimises the heat transfer from the block to the reaction solution.

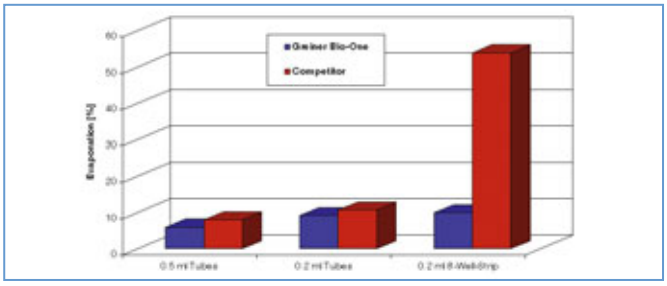
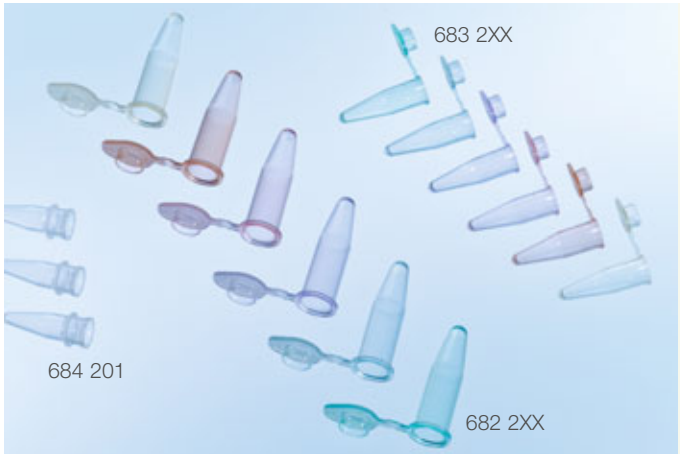


Figure 1: Evaporation in PCR tubes filled with H_2O measured according to the weight loss after 2 hours' incubation at 100 °C.



PCR Tubes

Standard Reaction Tubes p. 213

- Thin wall for optimal heat transfer

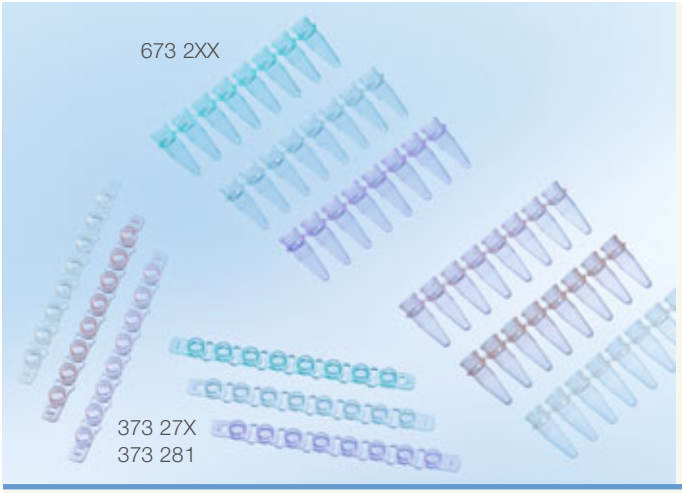
PCR Free of detectable DNase, RNase, human DNA non-pyrogenic

Description			tubes	tubes	tubes
Volume [ml]			0.2	0.2	0.5
Cap, attached			flat	without	flat
					
COLOUR	Natural	Cat.-No.	683 201	684 201	682 201
	Orange	Cat.-No.	683 272	-	682 272
	Red	Cat.-No.	683 273	-	682 273
	Blue	Cat.-No.	683 274	-	682 274
	Green	Cat.-No.	683 275	-	682 275
	Yellow	Cat.-No.	683 276	-	682 276
	Violet	Cat.-No.	683 277	-	682 277
	Assorted*)	Cat.-No.	683 271	-	682 281

*) Orange, Red, Blue, Green, Yellow, Violet

Quantity per bag/case for each Cat.-No.: 500/1000

PCR 8-tube Strips / PCR 8-cap Strips



PCR 8-tube Strips
PCR 8-cap Strips

Standard Reaction Tubes p. 213

PCR Microplates p. 162-164

- Thin wall for optimal heat transfer
- Low evaporation rate in PCR (Fig. 1)

Cap Strips for Real Time PCR
All Real Time PCR cap strips (Cat.-No. 373 250 and 652 258) have a flat lid and are made of highly transparent polypropylene. These are ideal for Real Time PCR applications, and are compatible with most Real Time PCR devices. (For compatibility with 8-tube strips and PCR microplates see table below.)

Figure 2: 8-cap strips for Real Time PCR

PCR | Free of detectable DNase, RNase, human DNA | non-pyrogenic

Description	8-tube strip	8-cap strip	8-cap strip	8-cap strip
Suitable for tube strip Cat.-No.	-	673 2XX	673 2XX	-
Suitable for microplate Cat.-No.	-	652 201, 652 260, 652 270, 652 280, 652 290	652 201, 652 260, 652 270, 652 280, 652 290	652 250, 669 285
Volume [ml]	0.2	-	-	-
Special feature	-	-	for RT PCR	for RT PCR

COLOUR						
Natural	Cat.-No.	673 210	373 270	373 250	652 258
Orange	Cat.-No.	673 272	373 272	-	-
Red	Cat.-No.	673 273	373 273	-	-
Blue	Cat.-No.	673 274	373 274	-	-
Green	Cat.-No.	673 275	373 275	-	-
Yellow	Cat.-No.	673 276	373 276	-	-
Violet	Cat.-No.	673 277	373 277	-	-
Assorted*)	Cat.-No.	673 271	373 281	-	-

*) Orange, Red, Blue, Green, Yellow, Violet

Quantity per bag/case: 125/1250
Quantity per assorted*) bag/case: 126/1260
Quantity for Cat.-No. 652 258: 120/480

PCR Microplates

96 and 384 Well Polypropylene Microplates for PCR

The use of the 96 well format allows the scale up of basic PCR work, while the 384 well format is ideal for high-throughput screening projects. All microplates are made of thin-walled polypropylene. This optimises the heat transfer from the thermoblock to the reaction solution. Our heat-resistant sealers AMPLIseal™, VIEWseal™ and SILVERseal™ (→ p. 205-207) are ideal for sealing the microplates during PCR, and the 96 well microplate may also be sealed with 8-cap strips (→ p. 161).

96 Well Polypropylene Microplates for PCR

1. Non-skirted microplates
Non-skirted microplates may be used in all commonly available thermocyclers with a 96 well block.

1a) Non-skirted microplate with raised well rims (Fig. 1a)

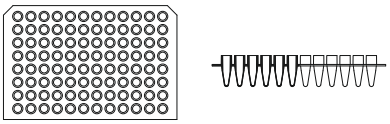


Figure 1a: View of a non-skirted microplate with raised well rims

1b) Non-skirted microplate with flat surface (Fig. 1b)
Black alphanumeric coding enables a quick identification of samples

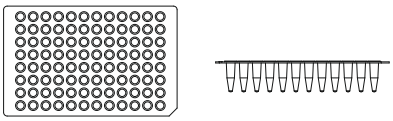


Figure 1b: View of a non-skirted microplate with flat surface

2. Half-skirted microplates

2a) Half-skirted microplate with one notch suitable for Real Time PCR systems such as LightCycler® 480 (Fig. 2a)
- Maximal pigmented white polypropylene and therefore most suitable for sensitive Real Time PCR reactions
- Black alphanumeric coding enables a quick identification of samples
- Notches in the rim facilitate automation due to better gripping in robotic systems

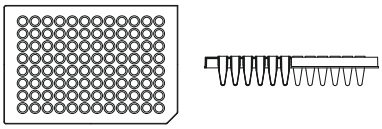


Figure 2a: View of a half-skirted microplate with one notch suitable for Real Time PCR systems such as LightCycler® 480 from Roche

2b) Half-skirted microplate with one notch suitable for ABI (Fig. 2b)

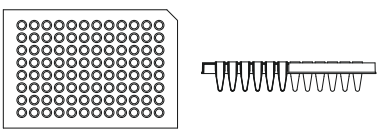


Figure 2b: View of a half-skirted microplate with one notch suitable for ABI

2c) Half-skirted microplate with two notches (Fig. 2c)
- 96 well standard design with two notches

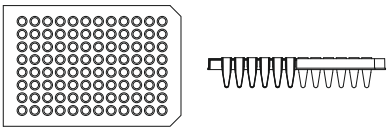


Figure 2c: View of a half skirted microplate with two notches

2d) Half-skirted microplate, recessed rim, ABI design with one notch (Fig. 2d)

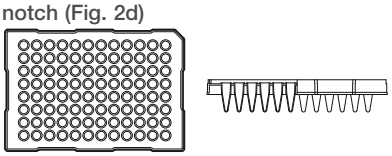


Figure 2d: View of a half-skirted microplate, recessed rim, ABI design with one notch

3. Full-skirted microplate with one notch (Fig. 3)

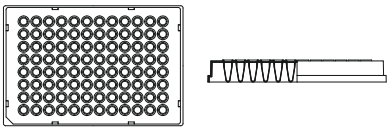


Figure 3: View of full-skirted microplate with one notch

384 Well Polypropylene Microplates for PCR

The 384 well PCR microplates from Greiner Bio-One are manufactured in an advanced injection moulding process following stringent quality criteria. Minimal distortion and sagging curvature, homogeneous heat transfer and sealing of the individual wells are essential quality criteria here. The footprint of all 384 well PCR microplates is compatible with automated systems.

1. Full-skirted 384 well microplate with one notch suitable for ABI (Fig. 4)

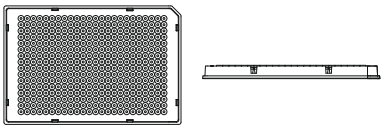


Figure 4: Full-skirted 384 well microplate with one notch and alphanumeric coding suitable for ABI

2. Full-skirted 384 well microplate with two notches (Fig. 5)

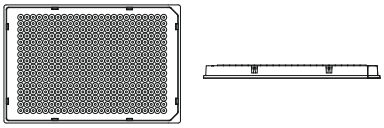


Figure 5: Full-skirted 384 well microplate with two notches and alphanumeric coding

3. Full-skirted 384 well microplate with two notches for Real Time PCR systems such as LightCycler® 480 (Fig. 6)
- White pigmentation boosts Real Time PCR signal
- Black alphanumeric coding enables a quick identification of samples

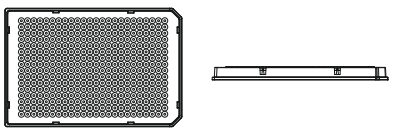


Figure 6: Full-skirted 384 well microplate with two notches for Real Time PCR systems such as LightCycler® 480 from Roche

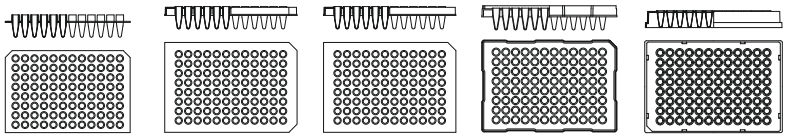
96 Well Polypropylene Microplates for PCR

Table of Compatibility, Technical Appendix p. 236-237

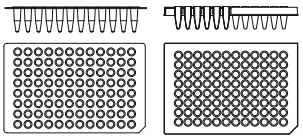
Barcode Labelling p. 220

- Ultra thin polypropylene for optimal heat transfer
- Cat.-No. 652 250 and 669 285 feature black alphanumeric well coding
- Sealable with sealers SILVERseal™, VIEWseal™ and AMPLIseal™ (→ p. 205-207) or with compatible 8-cap strips (→ p. 161)

PCR | Free of detectable DNase, RNase, human DNA | non-pyrogenic



Cat.-No.	652 201	652 280	652 290	652 260	652 270
Well format	96 well	96 well	96 well	96 well	96 well
Volume per well [ml]	0.2	0.2	0.2	0.2	0.2
Skirt	without skirt	half-skirt	half-skirt	half-skirt	full-skirt
Special feature	-	-	suitable for ABI	ABI design	-
Colour	natural	natural	natural	natural	natural
Sterile	-	-	-	-	-
Suitable 8-cap strip Cat.-No.	373 2XX	373 2XX	373 2XX	373 2XX	373 2XX
Quantity per bag/case	10/40	10/40	10/40	10/40	10/40



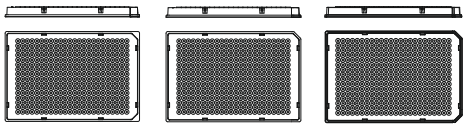
Cat.-No.	652 250	669 285
Well format	96 well	96 well
Volume per well [ml]	0.2	0.2
Skirt	without skirt	half-skirt
Special feature	flat, universal	suitable for LightCycler®
Colour	natural	white
Alphanumeric coding	black	black
Sterile	-	-
Suitable 8-cap strip Cat.-No.	652 258	652 258
Quantity per bag/case	25/100	25/100

384 Well Polypropylene Microplates for PCR

Table of compatibility, Technical Appendix p. 236-237
Barcode labelling p. 220

- Ultra thin polypropylene for optimal heat transfer
- Alphanumeric well coding
- Sealable with sealers SILVERseal™, VIEWseal™ and AMPLIseal™ (→ p. 205-207)
- White and black microplate versions of Cat.-No. 785 201 and 785 290 are available on request

PCR | Free of detectable DNase, RNase, human DNA | non-pyrogenic



Cat.-No.	785 201	785 290	785 285
Well format	384 well	384 well	384 well
Volume per well [µl]	25	25	25
Skirt	full-skirt	full-skirt	full-skirt
Special feature	-	suitable for ABI	suitable for LightCycler®
Colour	natural	natural	white
Alphanumeric coding	blue	blue	black
Sterile	-	-	-
Quantity per bag/case	15/60	15/60	25/100

Notes

INFORMATION

Interested in other Reaction Tubes?

Have a look at chapter 13 of our catalogue

Standard Reaction Tubes (p. 213)

Or interested in Sealers for PCR?

Have a look at chapter 12 of our catalogue

VIEWseal™ and AMPLIseal™ (p. 206-207)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A

8 Protein Crystallisation

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Coverslips 172

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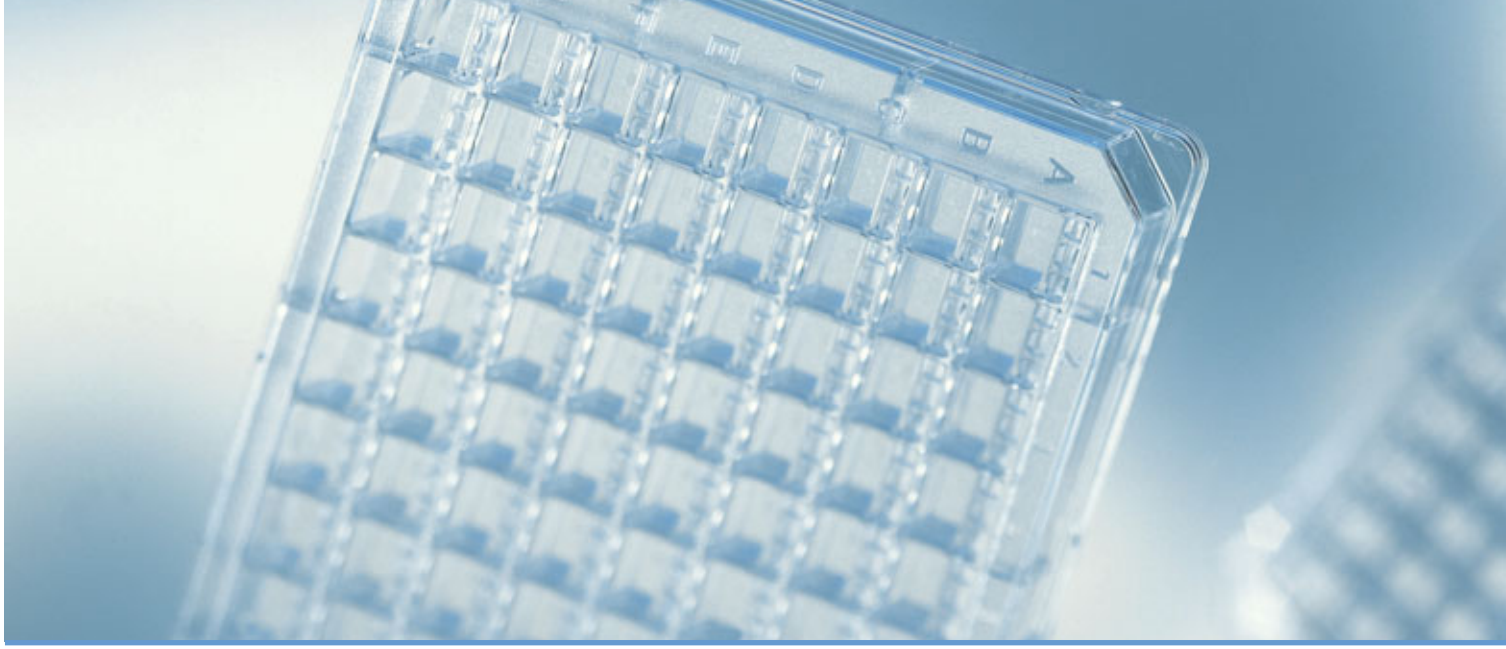
60 Well Terasaki Plate 173
72 Well Terasaki Plate 173

CrystalSlide™ 174



Protein Crystallisation

An important method for the determination of protein structures is x-ray analysis of protein crystals. The determination of the three-dimensional structure of proteins has contributed towards major advances in basic research, particularly in the fields of structural genomics and structure-based drug design.

The most commonly used method for the crystallisation of proteins is vapour diffusion which comprises both the sitting drop and hanging drop methods (Fig. 1a and Fig. 1b). One drop of protein solution is mixed with one drop of reagent solution and incubated together with a larger volume of reagent solution in a sealed well. Concentration gradients between the sample drop and the reservoir solution are balanced out by diffusion, which induces the crystallisation process if the correct conditions have been selected.

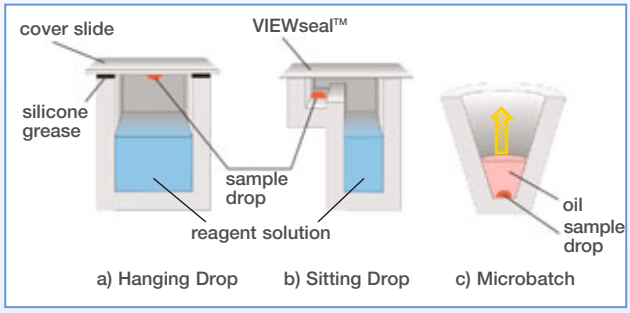


Figure 1: Crystallisation methods
a) Hanging Drop b) Sitting Drop c) Microbatch

The microbatch method (Fig. 1c) in which the sample drop is covered with oil is also widely used, and in this technique the choice of oil determines the rate of diffusion of the water in the sample drop through the oil.

Numerous factors affect the crystallisation of proteins. Since the optimal crystallisation conditions generally cannot be predicted, a large number of attempts is often necessary in order to determine and optimise the appropriate conditions. Protein crystallisation therefore still represents a major bottleneck in structure analysis. The use of high-throughput technologies, such as pipetting robots and standardised microplates, makes it possible to test a large number of crystallisation conditions in a short period of time and with relatively small amounts of protein.
The **CrystalStar™** product range from Greiner Bio-One is a family of crystallisation plates and accessories designed specifically for high-throughput crystallisation.

Format

We place great value on the suitability of our protein crystallisation plates for use with automated systems. Therefore, with the exception of Terasaki plates, all crystallisation plates have a footprint conforming to the ANSI 1-2004 standard.

Barcode Labelling
Customer-specific barcode labelling is available on request for all crystallisation plates, with the exception of Terasaki plates.

Material
All Greiner Bio-One protein crystallisation plates, with the exception of the LBR plates (see below), are made from polystyrene. This is characterised by high clarity and excellent optical properties.

Hydrophobic Plates
Plates with a hydrophobic surface are particularly well suited for nanolitre crystallisation of membrane proteins. The surface properties of hydrophobic plates efficiently counteract the spreading of detergent-containing drops, respectively of drops with surfactant precipitants, such as MPD (Fig. 2). Moreover, the meniscus of the screening solution in the reservoir is substantially reduced, so that contamination through creeping of the screening solution into the crystallisation well are avoided.

LBR Plates for Polarised Light and UV-Light Detection
LBR (low birefringence) plates are specifically designed for the use of polarised light. LBR plates for sitting drop applications are made from polyolefin which is characterised by very low birefringence in comparison with polystyrene plates (Fig. 3). Extreme transparency, high chemical resistance and low water absorption are further characteristics of LBR plates. In addition to providing low birefringent background, the LBR plates also exhibit extremely low autofluorescence. This feature makes them suitable for crystal detection with UV-light.

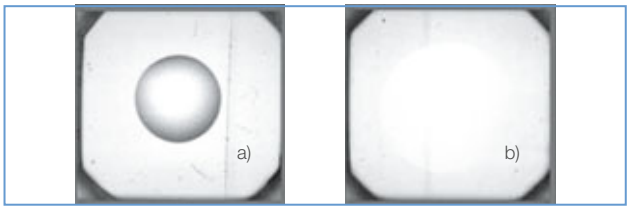


Figure 2: Comparison of (a) CrystalQuick™Plus (hydrophobic surface) and (b) CrystalQuick™ standard. Images of 100 nl drops containing 50 mM n-Octyl-Glucoside are courtesy of Karl Harlos, The Wellcome Trust Centre for Human Genetics, Oxford, UK.

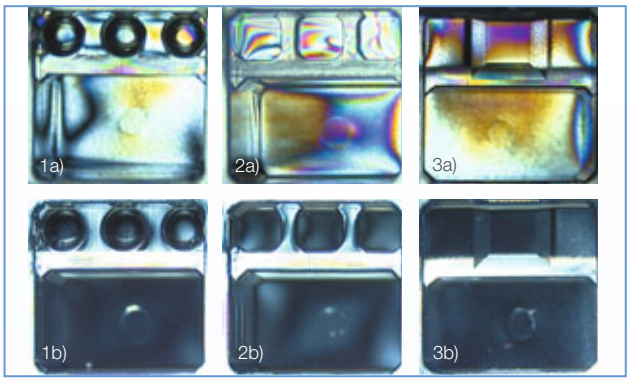


Figure 3: CrystalQuick™ plates in polarised light: (a) Standard versions with strong birefringence, (b) LBR versions with lower birefringence.
(1) CrystalQuick™ RW (2) CrystalQuick™ SW (3) CrystalQuick™ LP

Further information on protein crystallisation

→ **Forum No. 7: Advanced high-throughput platforms for protein crystallisation** (F073 016)

Cat.-No.	Description	Number of sample wells	Number of reservoirs	Special features
	Vapour Diffusion			
662 150	ComboPlate™	-	24	-
662 050	ComboPlate™	-	24	pre-greased
609 101	CrystalQuick™ SW (Square Wells)	288	96	-
609 801	CrystalQuick™ SW (Square Wells)	288	96	LBR
609 130	CrystalQuick™ Plus SW (Square Wells)	288	96	hydrophobic
609 830	CrystalQuick™ Plus SW (Square Wells)	288	96	LBR, hydrophobic
609 120	CrystalQuick™ RW (Round Wells)	288	96	-
609 820	CrystalQuick™ RW (Round Wells)	288	96	LBR
609 171	CrystalQuick™ LP (Low Profile)	96	96	-
609 871	CrystalQuick™ LP (Low Profile)	96	96	LBR
609 180	CrystalQuick™ Plus LP (Low Profile)	96	96	hydrophobic
	Microbatch			
653 102	Terasaki Plate	60	-	-
654 102	Terasaki Plate	72	-	-
	Accessories			
676 070	VIEWseal™	-	-	-
676 040	AMPLIseal™	-	-	-
662 145	CrystalBridge™	-	1	-
501 870	Coverslip, 18 mm ø, thickness 2 (0.19 – 0.22 mm)	-	-	glass, siliconised
503 870	Coverslip, 22 mm ø, thickness 2 (0.19 – 0.22 mm)	-	-	glass, siliconised
503 850	Coverslip, 22 mm ø, thickness 5 (0.5 – 0.6 mm)	-	-	glass, siliconised

Table 1: Overview of CrystalStar™ crystallisation plates and accessories.

Vapour Diffusion Applications

96 Well CrystalQuick™ Plates for Sitting Drop Applications

In cooperation with the Genomics Institute of the Novartis Research Foundation (GNF) in San Diego (USA), the Max-Planck Institute (MPI) and the Protein Structure Factory (PSF) in Berlin, Greiner Bio-One has developed a family of 96 well crystallisation plates for sitting drop applications. Each of the 96 reservoirs contains an elevated platform with either one or three crystallisation wells. The plates are optimised for sealing with VIEWseal™ and AMPLIseal™ adhesive film (→ p. 206-207). The external dimensions and tolerances of the CrystalQuick™ plates are suitable for automated applications. All CrystalQuick™ plates are available in an LBR version for the use of polarised light. Plates with a hydrophobic surface can be found in the table under CrystalQuick™ Plus plates.

CrystalQuick™ SW (Square Wells Fig. 1, Fig. 2)

With three crystallisation wells per reservoir, CrystalQuick™ SW makes it possible to test 288 samples per plate. The flat bottom of the wells provides for good optical properties. The maximum volume of the crystallisation drops is 4 µl (US Patent No. 7005008 B2).

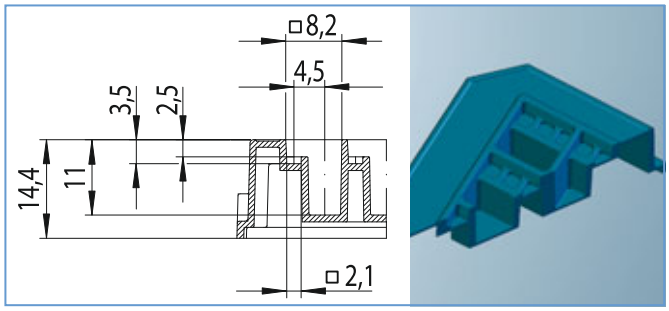


Figure 1: Well profile, CrystalQuick™ SW

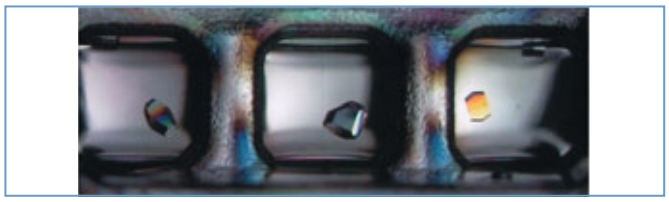


Figure 2: Crystallisation of lysozyme in CrystalQuick™ SW

CrystalQuick™ RW (Round Wells Fig. 3, Fig. 4)

With three round crystallisation wells per reservoir, CrystalQuick™ RW makes it possible to test 288 samples per plate.
The bottom of the crystallisation wells is concave.
The maximum volume of the crystallisation drops is 1.9 µl.

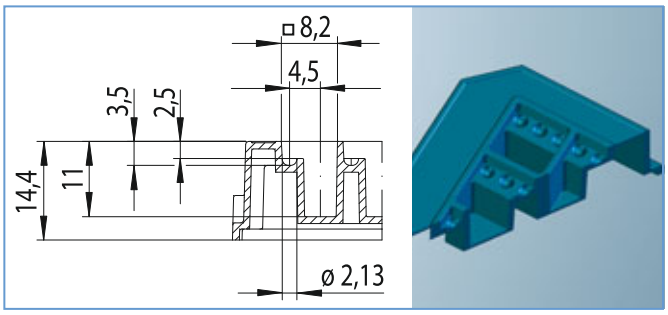


Figure 3: Well profile, CrystalQuick™ RW

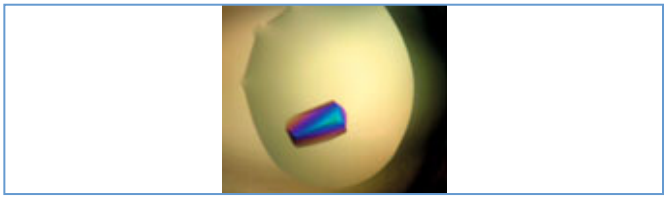


Figure 4: Protein crystal in CrystalQuick™ RW, the image was kindly supplied by B. Blattmann, NCCR Structural Biology, Switzerland

CrystalQuick™ LP (Low Profile Fig. 5, Fig. 6)

CrystalQuick™ LP (low profile) crystallisation plates are characterised by excellent optical properties. Crystal harvesting is made easier by the angled walls of the crystallisation wells. The low profile reduces space requirements for storage.

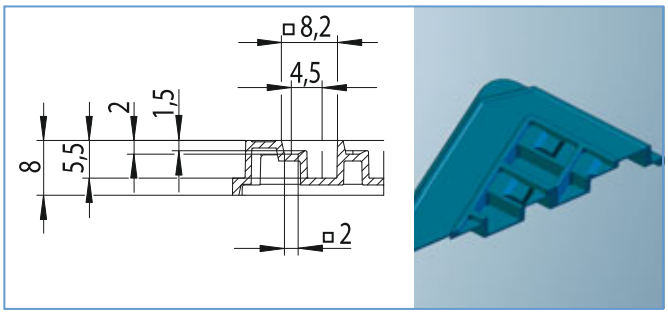


Figure 5: Well profile, CrystalQuick™ LP

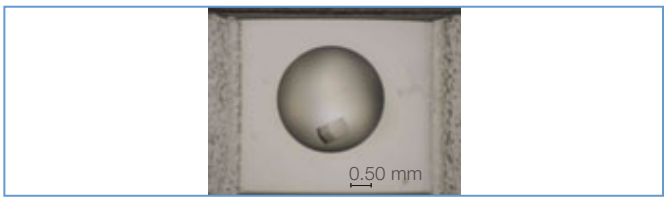
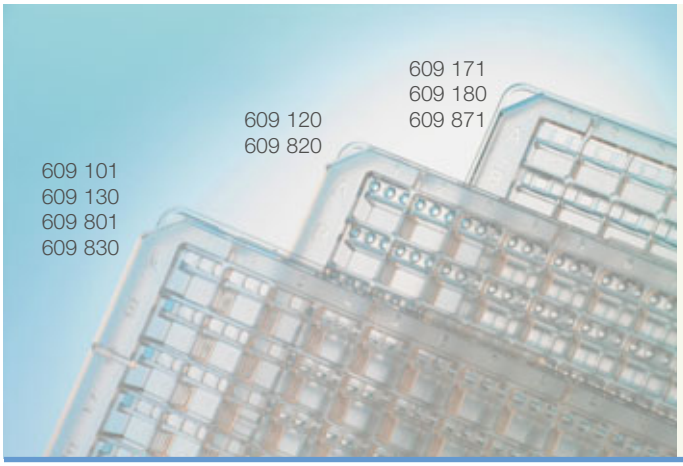


Figure 6: Crystallisation of lysozyme in CrystalQuick™ LP, RoboDesign International Inc., Carlsbad (USA)

! All CrystalQuick™ plates feature an alphanumeric well coding.

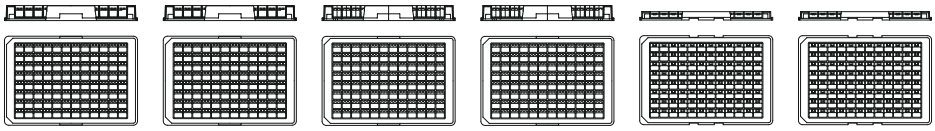


96 Well CrystalQuick™
96 Well CrystalQuick™ Plus

Lids and Sealers p. 204-208

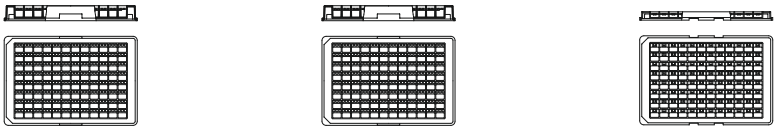
- Crystallisation plates for sitting drop applications with different well profiles and material properties
- Alphanumeric well coding

CrystalQuick™



Cat.-No.	609 101	609 801	609 120	609 820	609 171	609 871
Description	CrystalQuick™	CrystalQuick™	CrystalQuick™	CrystalQuick™	CrystalQuick™	CrystalQuick™
Material properties	standard	LBR	standard	LBR	standard	LBR
Well profile	square (SW)	square (SW)	round (RW)	round (RW)	square (LP)	square (LP)
Well bottom	flat	flat	concave	concave	flat	flat
Well per reservoir	3	3	3	3	1	1
Max. well volume [µl]	4.1	4.1	1.9	1.9	3.9	3.9
Volume per reservoir [µl]	320	320	320	320	140	140
Height [mm]	14.4	14.4	14.4	14.4	8.0 (low profile)	8.0 (low profile)
Quantity per bag/case	10/40	10/40	10/40	10/40	20/80	20/80

CrystalQuick™ Plus



Cat.-No.	609 130	609 830	609 180
Description	CrystalQuick™ Plus	CrystalQuick™ Plus	CrystalQuick™ Plus
Material properties	hydrophobic	LBR, hydrophobic	hydrophobic
Well profile	square (SW)	square (SW)	square (LP)
Well bottom	flat	flat	flat
Well per reservoir	3	3	1
Max. well volume [µl]	4.1	4.1	3.9
Volume per reservoir [µl]	320	320	140
Height [mm]	14.4	14.4	8.0 (low profile)
Quantity per bag/case	10/40	10/40	20/80

24 Well ComboPlate™, CrystalBridge™ and Coverslips

24 Well ComboPlate™, CrystalBridge™ and Coverslips

Lids and Sealers p. 204-208

- Universal 24 well crystallisation plate
- Pre-greased plates available
- Siliconised coverslips available

ComboPlate™
The ComboPlate™ was developed as universal platform for crystallisation in the 24 well format in cooperation with Hampton Research (Fig. 7). Clear polystyrene in combination with a flat, distortion-free bottom offers excellent optical properties.
A flattened, raised ring around each well reduces the risk of cross-contamination and makes it possible to seal the wells with silicone grease and coverslips (ø 18 mm) or VIEWseal™ sealer (Cat.-No. 676 070). A slightly raised lid protects the coverslips and sealer during transportation and storage.

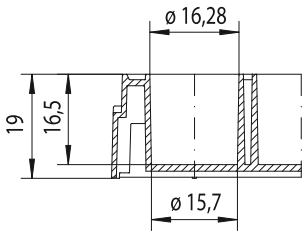
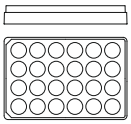
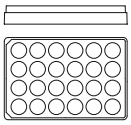
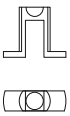


Figure 7: Well profile, 24 well ComboPlate™

The ComboPlate™ is also available pre-greased or in an LBR version for use with polarised light.
As an accessory for the ComboPlate™ Greiner Bio-One offers siliconised coverslips (round, ø 18 mm) (Fig. 8). Siliconised coverslips for Linbro plates (round, ø 22 mm) can also be found in our product line.

Figure 8: ComboPlate™ sealed with coverslips

CrystalBridge™
Sitting drop experiments are possible using the CrystalBridge™ inserts which fit exactly into the wells of the ComboPlate™.
The well with a concave bottom integrated into the CrystalBridge™ has a volume of 45 µl. If necessary, CrystalBridge™ inserts can be transferred to another well during the course of an experiment.

Cat.-No.	662 150	662 050	662 145
Description	ComboPlate™	ComboPlate™	CrystalBridge™
Material properties	-	pre-greased	-
Format	24 well	24 well	1 well
Well bottom	flat	flat	concave
ø Well [mm]	16.3	16.3	4.6
Max. well volume [µl]	3300	3300	45
Lid	+	+	-
Quantity per bag/case	6/24	6/24	250

Cat.-No.	501 870	503 870	503 850
Description	round coverslips	round coverslips	round coverslips
Material properties	siliconised glass	siliconised glass	siliconised glass
ø [mm]	18	22	22
Thickness [mm]	0.19 – 0.22	0.19 – 0.22	0.5 – 0.6
Quantity per box/case	100/1000	100/1000	25/1000

Microbatch under Oil Applications

60 Well and 72 Well Terasaki Plates

60 Well / 72 Well Terasaki Plates

Surface-treated Terasaki Plates p. 113

60 Well and 72 Well Terasaki Plates
Terasaki plates are widely used for microbatch crystallisation. The crystallisation drop is localised centrally as a result of the conical well geometry, and the flat well bottom makes for optimal monitoring (Fig. 1). The rim of the Terasaki plates makes it possible to fill all of the wells with oil at the same time. As a result of the small external dimensions and the low profile of the Terasaki plates, the space required for storage is relatively small. Terasaki plates are supplied with a fitting lid.
The plates are also supplied with surface treatment (→ p. 113). The treatment of the plates influences the sticking of the crystallisation drop to the bottom of the well.

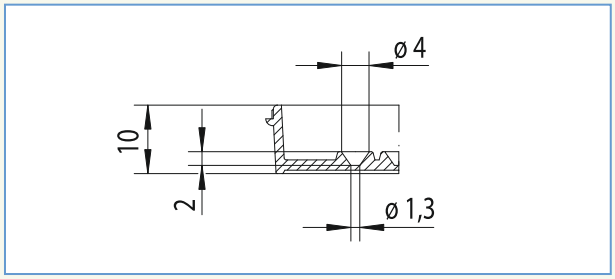
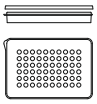
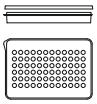


Figure 1: Well profile, Terasaki plate

Cat.-No.	653 102	654 102
Description	Terasaki plate	Terasaki plate
Format	60 well	72 well
Well profile	conical	conical
Well bottom	flat	flat
ø Well bottom [mm]	1.3	1.3
Working volume per well [µl]	10	10
Max. volume per well [µl]	11.5	11.5
Length [mm] x width [mm] x height [mm]	83.3 x 58 x 10	83.3 x 58 x 10
Surface treatment	-	-
Quantity per bag/case	10/580	10/270

CrystalSlide™

Micro-channel Platform for Counter Diffusion Crystallography

Greiner Bio-One developed a platform for Counter Diffusion Crystallography in a standard microscope slide format in collaboration with the laboratory of Peter Kuhn, The Scripps Research Institute, La Jolla, CA, USA. The platform features 12 channels (0.1 mm x 0.1 mm x 20 mm) for counter diffusion experiments. Filling reservoirs are optimised for the use of Greiner Bio-One crystal tips (→ p. 143). Automated handling is facilitated by housing four slides in a slide holder with standard microplate footprint. Due to its design and material properties CrystalSlide™ is well suited for in situ X-ray analysis and crystal analysis with polarised light or UV-light (Fig. 1).

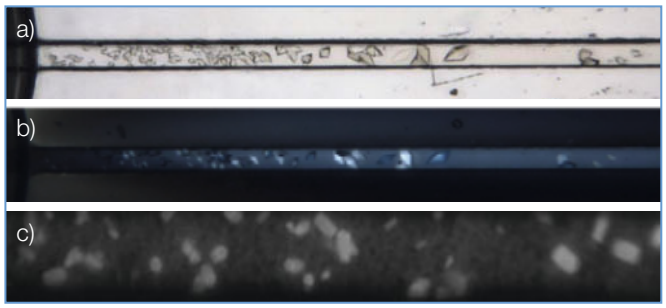


Figure 1: Bright field (a), polarised (b) and UV-fluorescence (c) images of protein crystals in CrystalSlide™. Images are courtesy of Peter Kuhn, The Scripps Research Institute, La Jolla, CA, USA.

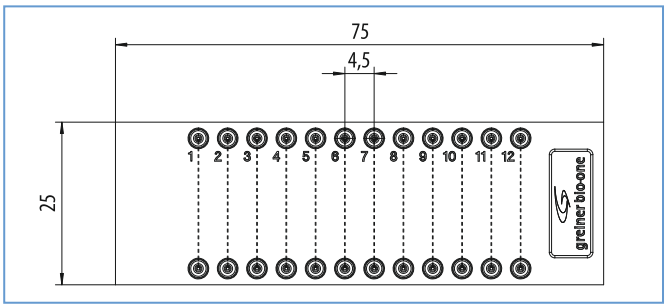
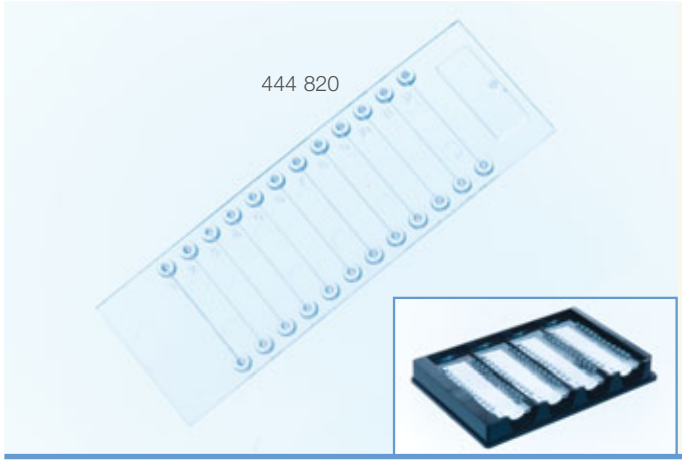


Figure 2: Schematic drawing of CrystalSlide™

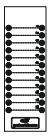


CrystalSlide™

→ **Crystal Pipette Tips p. 143**

→ **CrystalSlide™ User Guide (order no. F073 053)**

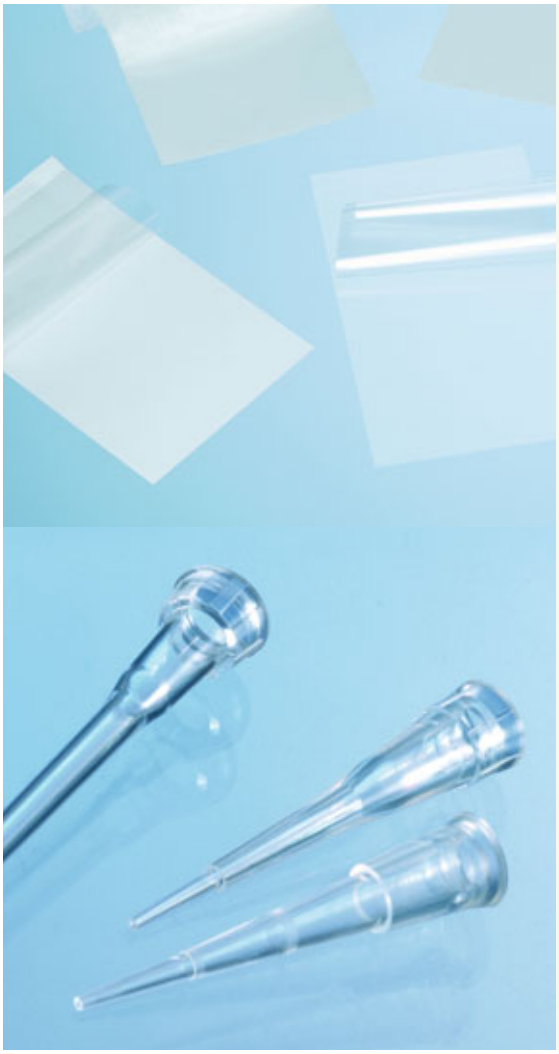
- Micro-channel platform for counter diffusion crystallography
- Slide holder available on request



Cat.-No.	**444 820**
Description	CrystalSlide™
Material properties	LBR, UV-transmissible, X-ray transmissible
Slide dimensions (L x W) [mm]	75 x 25
Channel dimensions (L x W x H) [mm]	20 x 0.1 x 0.1
Number of channels per slide	12
Channel volume [µl]	200
Quantity per box/case	4/20

Notes

INFORMATION



Interested in Sealers for Protein Crystallisation?

Have a look at chapter 12 of our catalogue

VIEWseal™ and AMPLIseal™ (p. 206-207)

Literature about Sealers:

Forum No. 6: Sealers for microplates and their areas of application in molecular biology and cell culture (F073 013)

Or interested in Crystal Tips?

Have a look at chapter 6 of our catalogue

Crystal Pipette Tips (p. 143)

9 Separation

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Separation

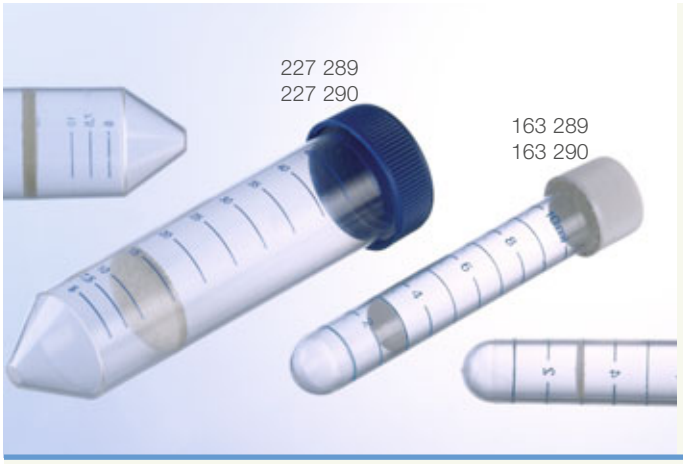
Different separation techniques can be used to enrich certain particles (DNA, RNA, proteins, organelles, vesicles, micelles, cells etc.) specifically from complex biological mixtures such as cell and tissue homogenates, blood, urine and other body fluids, so that they can then be selectively investigated. Separation of these types of particles can be based either on the different sedimentation rates of different particles in a fluid, or on their different densities. **Density gradient centrifugation** (also referred to as band, equilibrium or isopycnic centrifugation), exploits the principle that particles of a certain density migrate into a density gradient until they reach an equilibrium density layer. The first applications of density gradient centrifugation were reported in the early 1950s. Back then, cell organelles were enriched with the aid of buffered saccharose gradients and it is uncontested that the knowledge gained with these enriched materials made a contribution to modern molecular biology.

Soon it was discovered that the enrichment of mammalian cells requires more complex separation media, particularly due to their sensitivity towards osmotic fluctuation. Noble and Boyum described methods for separating mono-nuclear cells from whole blood and bone marrow as early as 1967 and 1968. Based on this pioneering scientific work, numerous applications in today‘s biomedical research and routine diagnostics require highly enriched, viable and functionally intact cell populations as the starting material. The separation of such cells by density gradient centrifugation has proven to be the most often used method due to its uncomplicated and robust nature.

With **Leucosep™**, Greiner Bio-One optimised density gradient centrifugation whilst making it user-friendly. Alongside this, **OncoQuick®** was developed to extend the spectrum of applications to deal specifically with oncological targets.

Leucosep™

12 ml and 50 ml Leucosep™ Tubes



Leucosep™

Efficient separation of lymphocytes and mononuclear cells from peripheral blood and bone marrow

Features:

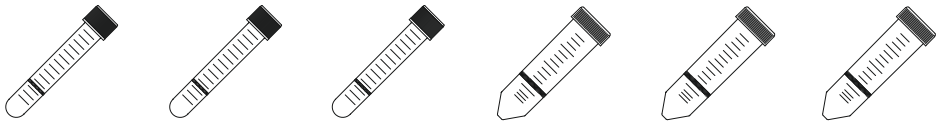
- Enrichment directly from whole blood
- Simplified filling through porous barrier
- Rapid separation in 15 minutes at room temperature
- No additional laboratory equipment required
- Removal of erythrocytes and granulocytes
- No recontamination with erythrocytes
- No blocking of marker molecules
- Pre-filled option with Leucosep™ separation medium
- Available unfilled for usage of different separation media

Leucosep™ was developed for optimal separation of lymphocytes and peripheral mononuclear cells (so-called PBMCs) from human whole blood and bone marrow. The key feature of Leucosep™ is the porous barrier incorporated into the centrifuge tube made of highly translucent polypropylene. This barrier consists of high-grade polyethylene. It shows a precisely controlled pore size and does away with the time-consuming and laborious overlaying of the sample material. Anticoagulated blood or bone marrow can simply be poured directly from the blood sampling tube into the Leucosep™ tube. The porous barrier prevents mixture of the sample material with the separation medium. During centrifugation, lymphocytes and PBMCs are separated from unwanted erythrocytes and granulocytes on the basis of their density, and enriched in an interphase above the separation medium. When separation is complete, the barrier prevents recontamination of the enriched cell fraction during harvest.

Leucosep™ may be used in combination with all common separation media for PBMC separation. For maximum convenience Leucosep™ tubes are available as pre-filled tubes. The contained Leucosep™ separation medium has a density of 1.077 g/ml and yields excellent separation results.

Typical separation results with Leucosep™ separation medium:	
Vitality	
Viable cells [%]	95 ± 5
Cell yield	
Lymphocytes [% of original number]	60 ± 20
Composition of enriched cell fraction	
Mononuclear cells [%]	95 ± 5
Granulocytes [%]	5 ± 5
Erythrocytes [%]	< 1
Composition of lymphocyte fraction	
T cells [%]	83 ± 3
B cells [%]	6 ± 3
NK cells [%]	11 ± 2

non-cytotoxic | non-pyrogenic



Cat.-No.	163 288	163 289	163 290	227 288	227 289	227 290
Description	Leucosep™ tubes with porous barrier	Leucosep™ tubes with porous barrier	Leucosep™ tubes with porous barrier	Leucosep™ tubes with porous barrier	Leucosep™ tubes with porous barrier	Leucosep™ tubes with porous barrier
Volume [ml]	12	12	12	50	50	50
Separation medium	+/ pre-filled with Leucosep™ separation medium	-	-	+/ pre-filled with Leucosep™ separation medium	-	-
Sterile	as	-	+	as	-	+
Sample volume	3 – 8 ml blood	3 – 8 ml blood	3 – 8 ml blood	15 – 30 ml blood	15 – 30 ml blood	15 – 30 ml blood
Quantity per box/case	50/500	50/500	50/500	25/250	25/300	25/300

as = aseptically produced

Instruction Manual Leucosep™

The Method

Leucosep™ has been developed for optimal separation of lymphocytes and peripheral mononuclear cells (so-called PBMCs) from human whole blood and bone marrow by means of density gradient centrifugation. The key feature of Leucosep™ is the porous barrier incorporated into the centrifuge tube made of highly translucent polypropylene. This barrier consists of high-grade polyethylene. It does away with the time-consuming and laborious overlaying of the sample material. Anticoagulated blood or bone marrow can simply be poured directly from the blood sampling tube into the Leucosep™ tube. The porous barrier prevents mixture of the sample material with the separation medium. During centrifugation, lymphocytes and PBMCs are separated from unwanted erythrocytes and granulocytes on the basis of their buoyant density, and enriched in an interphase above the separation medium. When separation is complete, the barrier prevents recontamination of the enriched cell fraction during harvest.

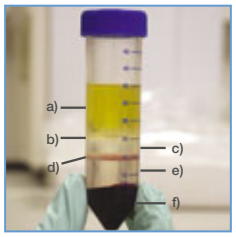
Preparation

- Warm up separation medium to room temperature (RT) protected from light.
- Fill the Leucosep™ tube with separation medium: 3 ml when using tubes Cat.-No. 163 289 or 163 290; 15 ml when using tubes Cat.-No. 227 289 or 227 290.
- Close the tubes containing the separation medium with the screw cap and centrifugate for 30 sec. at 1000 x g and RT. The separation medium is now located below the porous barrier.
- When using tubes that are prefilled with separation medium (Cat.-No. 163 288 or 227 288) the aforementioned steps can be cancelled. Simply warm up the tubes to RT.
- The tubes are now ready for filling with anticoagulated blood or bone marrow aspirate. Dilution of the sample material with balanced salt solution is not implicitly necessary, but it can help to improve the result of the separation. For blood a dilution ratio of 1:2, for bone marrow a ratio of 1:4 is recommended.

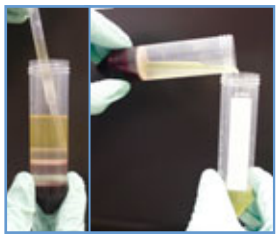
Procedure

1) Filling with sample material

2) Before centrifugation



3) After centrifugation



4) Harvest by means of a Pasteur pipette or by decanting into another centrifugation tube

1) Pour the anticoagulated sample material (blood or bone marrow aspirate, diluted with balanced salt solution if necessary) directly from the blood sampling tube carefully into the Leucosep™ tube: 3 – 8 ml of sample material when using tubes Cat.-No. 163 288, 163 289 or 163 290; 15 – 30 ml of sample material when using tubes Cat.-No. 227 288, 227 289 or 227 290.

2) Centrifugate 10 minutes at 1000 x g and RT or 15 minutes at 800 x g and RT in a swinging bucket rotor. Switch off brakes of the centrifuge.

3) After centrifugation the sequence of layers occurs as follows (seen from top to bottom): a) Plasma – b) enriched cell fraction (interphase consisting of lymphocytes / PBMCs) – c) separation medium – d) porous barrier – e) separation medium – f) pellet (erythrocytes and granulocytes). Collection and discarding of the plasma layer fraction up to a minimum remnant of 5 to 10 mm above the interphase helps to prevent contamination of the enriched cells with platelets.

4) Harvest the enriched cell fraction (lymphocytes / PBMCs) by means of a Pasteur pipette or by pouring the supernatant above the porous barrier from the Leucosep™ tube into another centrifugation tube. The porous barrier effectively avoids recontamination with pelleted erythrocytes and granulocytes.

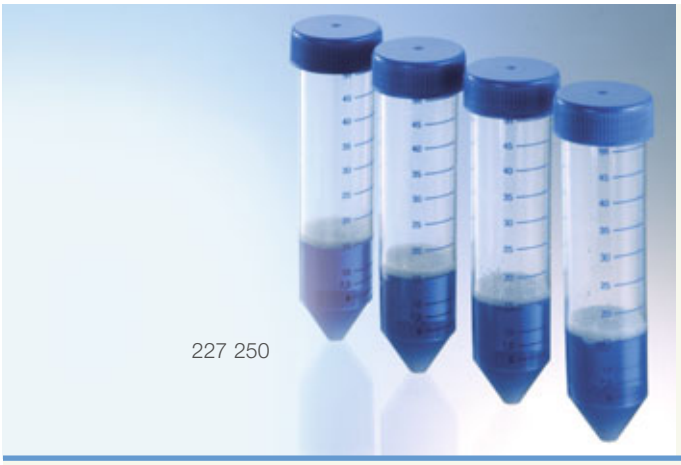
5) Wash the enriched cell fraction (lymphocytes / PBMCs) with 10 ml of phosphate-buffered saline (PBS), subsequently centrifugate for 10 minutes at 250 x g.

6) Repeat washing step twice, resuspend the cell pellet with 5 ml of PBS.

Caution

Handle all biological samples and blood collection lancets, needles, and blood collection sets in accordance with the policies and procedures of your facility. In case of any exposure or contamination with blood or other biological samples (e.g. accidental puncture injury) initiate appropriate medical treatment as such material has to be considered potentially infective with HBV, HCV (hepatitis), HIV (AIDS), or other infective agents.

OncoQuick®



227 250

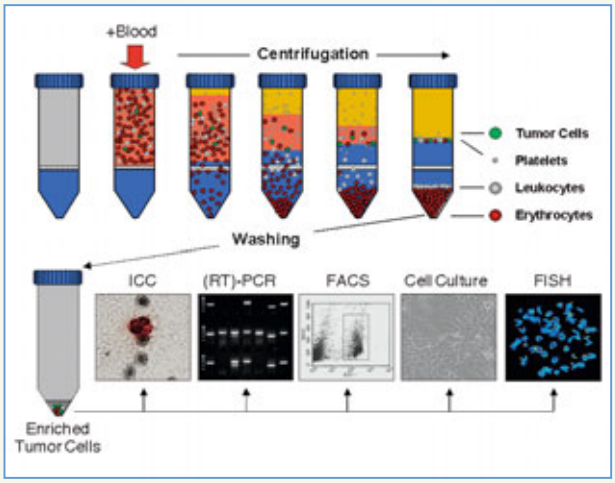
OncoQuick®

Enrichment of disseminated, circulating tumour cells from peripheral blood

Features:

- Time request approx. 45 minutes
- Reproducible recovery: > 70 %
- Depletion of blood cells by up to 6 log units
- No additional laboratory equipment required
- No need for magnetic beads
- No blocking of marker molecules
- Enrichment directly from whole blood

OncoQuick® is a simple-to-use, rapid and efficient system for the enrichment of circulating tumour cells that are released into the blood by a solid epithelial tumour or malignant melanoma. OncoQuick® combines the advantages of cell separation by density gradient centrifugation (rapid, reproducible and cost-effective) with recovery rates that are comparable with immunobead methods.
OncoQuick® consists of a sterile 50 ml polypropylene tube with a porous barrier which is inserted above the specially developed separation medium. Up to 30 ml of anticoagulated whole blood is directly filled into the OncoQuick® tube and centrifugated. Apart from erythrocytes and granulocytes, the separation medium also allows the elimination of lymphocytes and mononuclear cells to a wide extent. The disseminated tumour cells are enriched in the interphase. After harvesting, the enriched cell fraction is washed. The tumour cells are then available for all standard research methods. OncoQuick® was developed in a cooperation between Hexal Gentech and Greiner Bio-One and is intended for use for research purposes only!



Instructions for using OncoQuick® as well as further information can be found under www.gbo.com/bioscience.

non-cytotoxic | non-pyrogenic

	227 255*)	227 250
Cat.-No.		
Description	OncoQuick® tubes with porous barrier and separation medium	OncoQuick® tubes with porous barrier and separation medium
Sterile	as	as
Sample volume	15 – 30 ml blood	15 – 30 ml blood
Quantity per case	4	10

*) sample package with special price available only once as = aseptically produced


OEM
JUST FOR YOU

10 OEM / Microfluidics

OEM Services 184

Microfluidics 186

OEM Services

OEM Product Portfolio

Greiner Bio-One GmbH as an Original Equipment Manufacturer (OEM) is a long-term partner of the pharmaceutical industry, biotechnology, diagnostic and medical technology industries.

The OEM services range from 'simple' branding **(private labelling)** of an existing product line to fully customised manufacturing solutions **(true OEM)**. Whatever your requirement, we offer the best solution for your needs.

The product portfolio (Fig. 1) ranges from **laboratory supplies** up to numerous user-specific products:

As pioneers in the field of **microplates**, Greiner Bio-One develops new plate formats and geometries as well as production techniques such as the patented film bottom.

In the field of the **preanalytics** we offer the complete choice of customer-specific products for the sampling of body fluids (blood, urine, saliva).

We will also be glad to take over the **finishing of the plastic surface** by numerous surface modifications, as required by the customer and field of application.

In particular for the handling of samples at a microliter scale, we manufacture upon customer request **microfluidic product solutions** made of plastic material.

Based on the microarray technology Greiner Bio-One develops different customer-specific **DNA chips for medical diagnostics.** A large sample amount can be processed within the shortest time and be examined on the existence of certain viruses or bacteria.

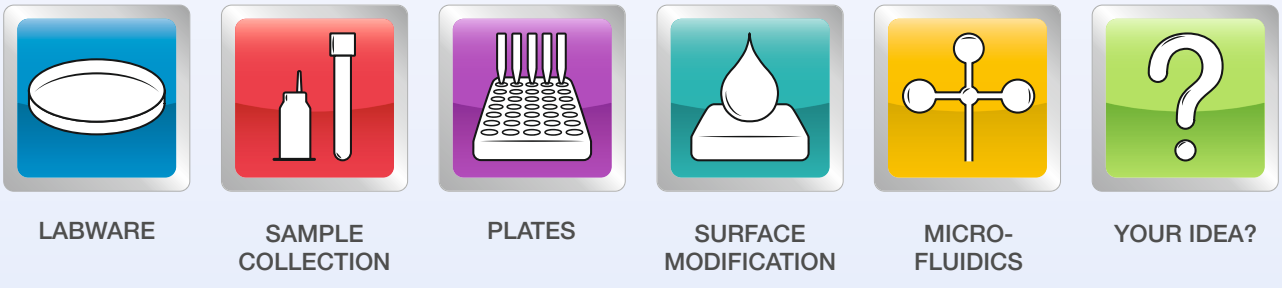


Figure 1: OEM product portfolio

OEM Service Portfolio

Greiner Bio-One manufactures numerous products through injection moulding and offers the entire product development and production process (Fig. 2) from an idea to the finished product:

- **Research & Development** with diverse application and research laboratories
- **Construction** of moulds, planning of plants and assembly lines
- Modern, fully automated **production**
- **Post production** according to customers' requirements
- Comprehensive **quality** assurance and management system
- **Worldwide** networked warehousing and customer service

From design, via prototyping, through fully automated manufacturing, Greiner Bio-One delivers the complete solution with support of experienced scientists, engineers and specialists.

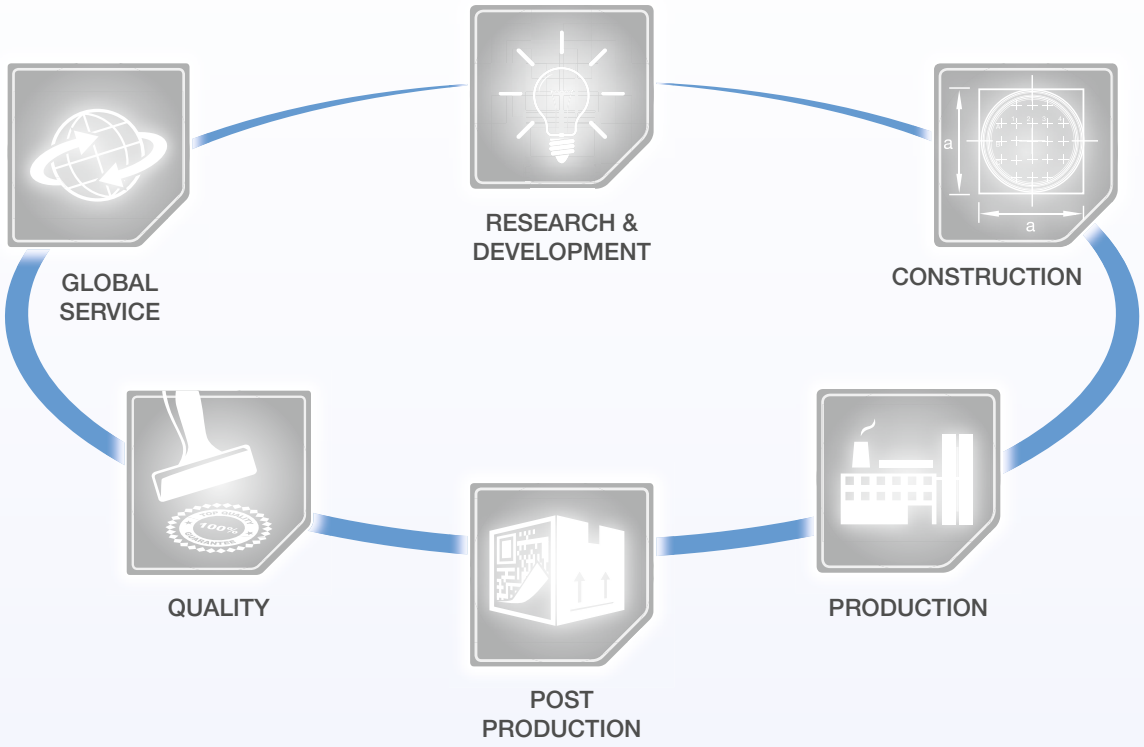


Figure 2: OEM service portfolio

Always close to the customer

As a global player and single source supplier, Greiner Bio-One offers **ultra-modern production plants on 4 continents** – with a centralised quality management system and a global procurement policy. As a result, customer-oriented production activities, high capacity, global warehousing and rapid delivery can be ensured. A code of conduct also governs worldwide company and employer business practices. With a **global sales network** specifically established for the field of OEM, Greiner Bio-One offers custom-made solutions with personal service.

Always highest quality standards

Quality is critical at Greiner Bio-One. All production sites are certified according to the international standards DIN EN ISO 9001, EN ISO 13485 as well as complying with FDA and CAMDCAS requirements for producers of medical products. Greiner Bio-One has established a multistage quality assurance system across all production sites. This starts with the goods-in control for raw materials. Further legal and customer-specified controls are applied throughout production. In addition, products are tested for compliance with customer-specific qualities such as sterility. Products are only considered as finished following strict quality checks. This is our quality promise.

Microfluidics

Customised Microfluidic Platforms

Through the use of modern manufacturing techniques it is now possible to produce microstructured components for the diagnostics, drug discovery, and research industry made from innovative plastic polymer materials. They offer substantial economical advantages, a large selection of quite diverse materials and surface treatments are available, and large format components can also be economically structured. The principal application areas are:

- Analytics / Diagnostics (electrophoresis, lab-on-a-chip)
- Chemistry (micromixers, reactors, heat exchangers)
- Drug discovery and liquid handling

For the production of microfluidic systems as single-use products, novel and innovative manufacturing techniques are required. A number of manufacturing processes can be utilised and today injection moulding is widely used to produce microstructured parts from plastics. The choice of material depends on the final application of the components. Common selection criteria are:

- Transparency
- Stability
- Chemical resistance
- Biocompatibility
- Surface properties (e.g. hydrophobicity)

A large number of different polymers are available (e.g. polystyrene, polymethylmethacrylate, polycarbonate, polypropylene). Additional surface treatments after moulding can further improve the properties of the chosen material, and compared to glass, a larger variety of options for surface modifications are available.

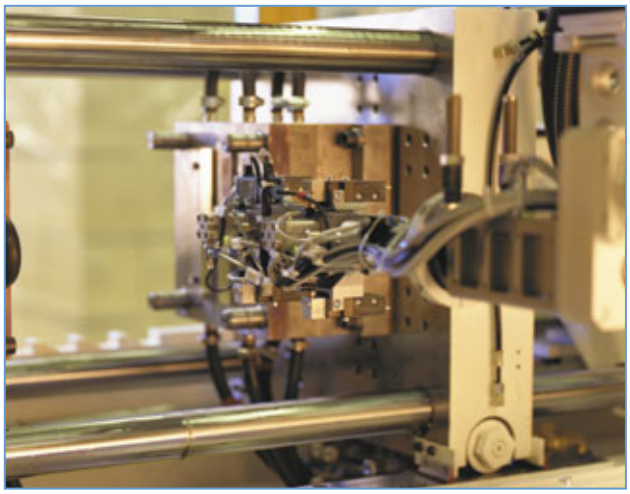


Figure 1: Production of microstructured parts by injection moulding.

Precise manufacturing of the mould insert is critical for the quality of the plastic component. Different methods are used depending on the structural size, precision and aspect ratio of the structure being moulded. Routinely, mechanical micromachining is used to create the required metal moulding tools. Using high-speed tools, microstructures can be produced even on large areas. For extremely precise mould inserts, galvanic/lithographic techniques are available.

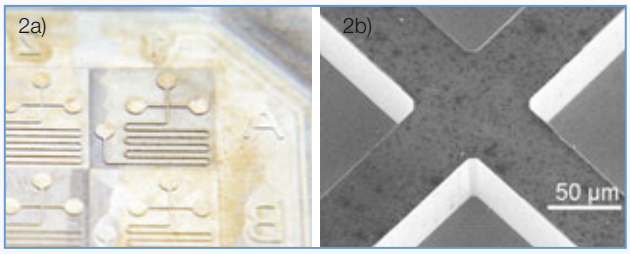


Figure 2a: Mould insert made of brass, manufactured by micro-milling.
Figure 2b: Detail of a mould insert made of nickel, manufactured by UV-LIGA.

Standard formats allow for fast and cost-efficient production of customer-specific designs from prototyping to production level. A common format in the life science is the microscope slide with a footprint of 25 mm x 75 mm.

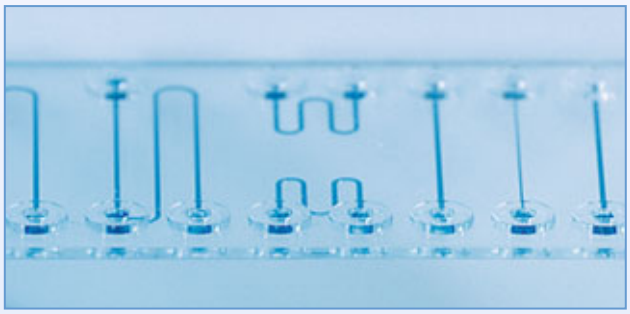


Figure 3: Microfluidic slide. Microchannels and macro-features (reservoirs, through-holes) were produced in one step.

Greiner Bio-One can produce microstructured components in a variety of shapes and dimensions and also larger formats, such as the microplate format, can be structured.

In many cases, the microstructured surface must be sealed with a lid in order to produce a closed channel system. Different joining methods, such as laser welding, ultrasonic welding, adhesive techniques and diffusion bonding are used. The incorporation of additional components such as electrodes or membranes into the microstructured part is also possible. To combine different materials, we have special welding and adhesive bonding techniques that have been adapted for microstructures.

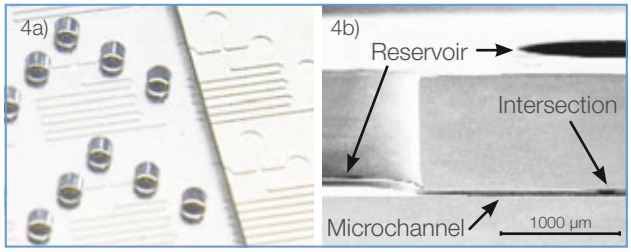


Figure 4a: Partly sealed structures for capillary electrophoresis.
Figure 4b: SEM image of the cross section through a closed microchannel (100 µm x 50 µm).

Our service

With our team of biologists, chemists, physicists, and engineers, we work closely with our customers. Built on our experience in plastics manufacturing, we can supply an innovative solution, custom-tailored to your requirements.

A large variety of materials is available to realise your design, in addition to which we offer several modification technologies to tailor the surface properties of your microstructured component to optimise it for your application.

We offer our services from the first draft to the product:

- Prototyping
- Small series production
- Mass production

11 Cryotechnics

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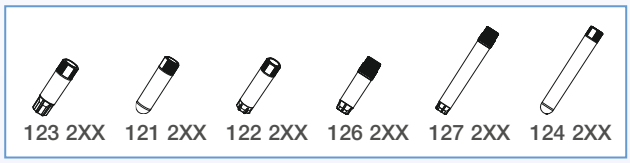
Cryotechnics

For sample freezing and storage, Greiner Bio-One offers a user-friendly system of cryogenic tubes including a variety of different Cryo.s™ with proprietary support and storage racks.

Cryo.s™ are suitable for storage of cell cultures, tissue samples, microbiological samples (e.g. viruses, bacteria, yeast, other fungi, spores), material of human or animal origin (such as blood, serum, sperm) as well as antibodies, RNA, DNA and protein samples. Cryo.s™ are not intended for sample storage within reproductive medicine.



The portfolio of Cryo.s™ tubes includes cryogenic tubes with different volumes, different base forms as well as several cap colours. Cryo.s™ offer several features for the identification and labelling of individual samples, to include coloured screw caps, a white, scratch-resistant writing area and barcoding options. In addition, white cap inserts are available in each box of Cryo.s™, allowing for the labelling of the top of the screw cap.

With Cryo.s™ with Datamatrix (→ p. 196) and the accessory racks in 48-way and 81-way formats (→ p. 197-198), Greiner Bio-one expands its portfolio by optimum solutions for semi-automated and automated sample handling and storage.

Finally, Cryo.s™ Biobanking Tubes (→ p. 199-200) represent perfect solutions for the space-efficient storage of biological samples in large-scale biorepositories.

Cryo.s™ Biobanking Tubes are available with working volumes of 235 µl, 580 µl and 975 µl and in highly automation-friendly racks.

The direct storage of tubes in liquid nitrogen is a general safety hazard. As a safety precaution, Cryo.s™ should be stored in freezers or in the gas phase over liquid nitrogen (not in the liquid phase).

Cryo.s™ from Greiner Bio-One are

- Endotoxin-free
- Non-cytotoxic
- Free of detectable DNase, RNase, human DNA
- Heavy-metal free
- Made from virgin, leachable-free, USP class VI certified, medical grade polypropylene

Sterile product versions are sterilised applying an ISO 11137 validated irradiation procedure yielding an SAL level of 10^{-6}.

!

Cryo.s™ must be evenly exposed to freezing temperatures.
→ Detailed freezing protocol in the Technical Appendix.
Please also follow the warning note / documentation provided within each box.

Air Shipment
Cryo.s™ meet the pressure requirements for transportation by aircraft. Hydrostatic pressure testing was performed according to the ICAO. IATA DGR guidelines. A certificate of conformity may be provided on request.

Cryo.s™

Cryo.s™ 1 ml and 2 ml

Cryo.s™
1 ml and 2 ml

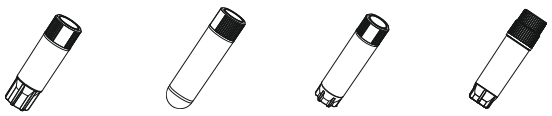
Datamatrix Codes on Cryo.s™ p. 196
Linear Barcodes on Cryo.s™ p. 220
Freezing Protocol, Technical Appendix

- CE-marked
- High thermal resistance
- Cap inserts Cat.-No. 304 171 (50 pieces per bag)
- Cryo.s™ with internal thread have a silicone gasket
- Leachable-free, USP class VI certified medical grade polypropylene

CE | IVD | Free of detectable DNase, RNase, human DNA | non-pyrogenic | non-cytotoxic

	Description	Cryo.s™ 1 ml	Cryo.s™ 2 ml	Cryo.s™ 2 ml	Cryo.s™ 2 ml
	Working volume [ml]	1 – 1.2	1.8 – 2.0	1.8 – 2.0	up to 2.2
	ø [mm] x height*) [mm]	12.5 x 42	12.5 x 48	12.5 x 48	12.4 x 47
	Starfoot	+	-	+	+
	Bottom	conical	round	round	round
	Thread	internal	internal	internal	external
	Sterile	+	+	+	+

*) total height incl. lid



COLOUR	Natural,	without writing area	Cat.-No.	123 261	121 261	122 261	126 261
	Natural,	with writing area	Cat.-No.	123 263	121 263	122 263	126 263
	Green,	with writing area	Cat.-No.	123 277	121 277	122 277	126 277
	Yellow,	with writing area	Cat.-No.	123 278	121 278	122 278	126 278
	Blue,	with writing area	Cat.-No.	123 279	121 279	122 279	126 279
	Red,	with writing area	Cat.-No.	123 280	121 280	122 280	126 280

with 150 inserts per case

Quantity per bag/case per Cat.-No.: 100/500

Cryo.s™ 4 ml and 5 ml

Cryo.s™
4 ml and 5 ml

Datamatrix Codes on Cryo.s™ p. 196
Linear Barcodes on Cryo.s™ p. 220
Freezing Protocol, Technical Appendix

- CE-marked
- High thermal resistance
- Cap inserts Cat.-No. 304 171 (50 pieces per bag)
- Cryo.s™ with internal thread have a silicone gasket
- Leachable-free, USP class VI certified medical grade polypropylene

CE | IVD | Free of detectable DNase, RNase, human DNA non-pyrogenic | non-cytotoxic

	Description	Cryo.s™ 4 ml	Cryo.s™ 5 ml
	Working volume [ml]	up to 4.0	4.5 – 5.0 **)
	ø [mm] x height *) [mm]	12.4 x 83	12.5 x 86
	Starfoot	+	-
	Bottom	round	round
	Thread	external	internal
	Sterile	+	+

*) total height incl. lid

**) Maximum working volume for freezing of aqueous solutions: 4.5 ml


COLOUR	Natural,	without writing area	Cat.-No.	127 261	124 261
	Natural,	with writing area	Cat.-No.	127 263	124 263
	Green,	with writing area	Cat.-No.	127 277	124 275
	Yellow,	with writing area	Cat.-No.	127 278	124 276
	Blue,	with writing area	Cat.-No.	127 279	124 274
	Red,	with writing area	Cat.-No.	127 280	124 273

with 100 inserts per case

Quantity per bag/case per Cat.-No.: 50/300

Support Rack


802 501

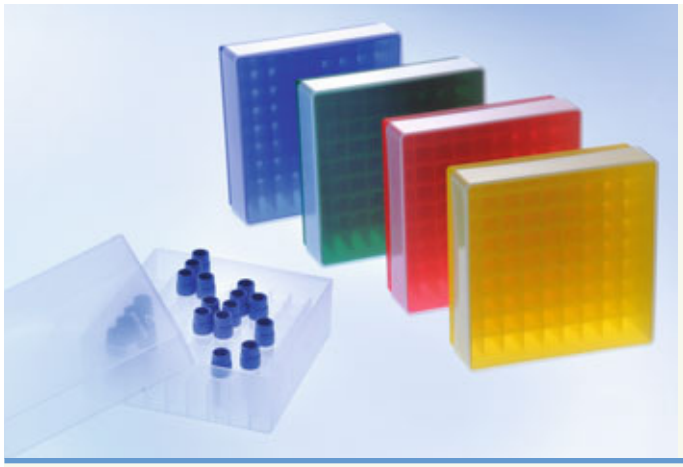
Support Rack

- Suitable for Cryo.s™ with starfoot base (Cat.-No. 122 XXX, 123 XXX, 126 XXX, 127 XXX)
- Improved handling since the tubes can be opened with one hand
- Rubber base to prevent slipping
- Offers space for up to 40 Cryo.s™

Cat.-No.	**802 501**
Description	support rack f. one-hand operation
Width [mm] x length [mm] x height [mm]	100 x 200 x 22
Material	polycarbonate
Colour	blue
Quantity per bag/case	1

Cryo Storage Box

The Cryo Storage Box is a helpful accessory for storing Cryo.s™ sample tubes at low and ultra-low temperatures. The box material polypropylene is very temperature and shock-resistant, thus allowing storage temperatures as low as -90 °C.



Cryo Storage Box

Cryo.s™ p. 191

- Holds 81 Cryo.s™ sample tubes
- Transparent lid for optimum visibility of box content
- Venting holes for facilitated air exchange between interior and exterior
- Easy lid removal
- Available in different colours
- Temperature-resistant polypropylene (-90 °C ~ +121 °C)

The Cryo Storage Box fits all 1 and 2 ml Cryo.s™ with internal and external threat (Cat.-No. 121 2XX, 122 2XX, 123 2XX and 126 2XX). It is compatible with standard LN2 containers and metal racks.

Cat.-No.	802 202	802 203	802 204	802 206	802 225
Description	Cryo Storage Box	Cryo Storage Box	Cryo Storage Box	Cryo Storage Box	Cryo Storage Box
Width x length x height*) [mm]	126.5 x 126.5 x 51	126.5 x 126.5 x 51	126.5 x 126.5 x 51	126.5 x 126.5 x 51	126.5 x 126.5 x 51
Material	polypropylene	polypropylene	polypropylene	polypropylene	polypropylene
Rack colour	natural	red	blue	yellow	green
Lid colour	natural	natural	natural	natural	natural
Quantity per bag/case	5/20	5/20	5/20	5/20	5/20

*) The indicated height refers to the Cryo Storage Box filled with 2 ml Cryo.s™ and covered with a lid.

Cryo.s™ with Datamatrix for Biobanking

With more than 30 years of experience in the field of cryo storage and continuous product development, Greiner Bio-One now offers a comprehensive range of state-of-the-art solutions for large-scale cryo storage in biorepositories.

Further information on biobanking
→ **Cryo.s™ with Datamatrix Code – Intelligent Solutions for Biobanking** (F073 788)

Cryo.s™ with Datamatrix and 48-way Datamatrix Cryo Rack with ANSI Footprint

Datamatrix codes have gained in popularity for use in tracking biological and medical reagents and samples. Among the advantages of Datamatrix codes is the nearly infinite scalability of the symbol, thus providing large data capacity within a small footprint. Datamatrix codes can be scanned and decoded independent of their orientation. Moreover, they offer the Reed-Solomon method of error correction which renders high resistance to inaccuracies caused by symbol damage.

Greiner Bio-One features a wide range of Cryo.s™ equipped with a Datamatrix tag on the tube bottom. The applied ECC200 code is the newest version of Datamatrix that supports advanced error correction algorithms with capability to decipher partially damaged codes. Datamatrix codes are laser-written, thus providing high resistance to mechanical strain and chemicals.

With the 48-way Datamatrix Cryo Rack, Greiner Bio-One expands its product line for cryogenic sample storage with a solution for automation-compatible tube storage. The rack accommodates 48 Cryo.s™ in a footprint area complying with the American National Standards Institute (ANSI) microplate standard. Along with automation compatibility, the rack offers helpful features for efficient and secure processing of sample information. Through-holes in the rack bottom allow visibility and scanning of the Datamatrices of the contained Cryo.s™ without the necessity of tube removal.

Further information on Datamatrix coding

→ **Forum No. 10: Datamatrix coding for sample identification with Cryo.s™ sample storage tubes** (F071 008)

Cryo.s™ with Datamatrix are compatible with numerous automated liquid handling and de-/re-capping systems. For further information on suppliers of compatible accessory equipment please refer to

→ **Forum No. 14: Cryo.s™ with Datamatrix and the novel Datamatrix Cryo Rack – automation and biobanking** (F073 116)

Cryo.s™ with Datamatrix 48-way Datamatrix Cryo Rack

Cryo.s™ p. 191-192
81-way Datamatrix Cryo Rack p. 198
Linear Barcodes on Cryo.s™ p. 220

Cryo.s™ with Datamatrix
- ECC200 Datamatrix code with Reed-Solomon algorithm for error correction
- Laser-written Datamatrix for improved durability and resistance to chemicals
- 100 % control of readability and uniqueness of Datamatrices
- Suitable for air shipment (IATA conformity)
- USP class VI certified medical grade polypropylene without leachables
- Sterility assurance level SAL 10^{-6}
- CE-marked
- Free of detectable DNase, RNase and human DNA; non-pyrogenic, non-cytotoxic
- Pre-produced, unique 2-D codes off the shelf or customised code sequences on request (to be specified in order form **F071 004**)

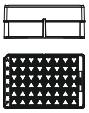
Preproduced unique Datamatrix Codes

Cat.-No.	123 263-2DG	122 263-2DG	126 263-2DG	127 263-2DG
Description	1 ml Cryo.s™	2 ml Cryo.s™	2 ml Cryo.s™	4 ml Cryo.s™
Working volume [ml]	1.0 – 1.2	1.8 – 2.0	up to 2.2	up to 4.0
Thread	internal	internal	external	external
Screw cap	natural	natural	natural	natural
Sterile	+	+	+	+
Coding option	Preproduced 2-D codes, 14 x 14 Datamatrix	Preproduced 2-D codes, 14 x 14 Datamatrix	Preproduced 2-D codes, 14 x 14 Datamatrix	Preproduced 2-D codes, 14 x 14 Datamatrix
Quantity per bag/case	100/500	100/500	100/500	50/300

Customised Datamatrix Codes

Cat.-No.	123 263-2D3	122 263-2D3	126 263-2D1	127 263-2D1
Description	1 ml Cryo.s™	2 ml Cryo.s™	2 ml Cryo.s™	4 ml Cryo.s™
Working volume [ml]	1.0 – 1.2	1.8 – 2.0	up to 2.2	up to 4.0
Thread	internal	internal	external	external
Screw cap	natural	natural	natural	natural
Sterile	+	+	+	+
Coding option	2-D code with customised content as specified in order form **F071 004**			
Quantity per bag/case	100/500	100/500	100/500	50/300
	New	New	New	New

48-way Datamatrix Cryo Rack


Cat.-No.	**803 277**	**803 202**	**803 270**
Description	Datamatrix Cryo Rack	Datamatrix Cryo Rack	Datamatrix Cryo Rack
Capacity	48 tubes	48 tubes	48 tubes
Compatible for Cryo.s™	1 / 2 / 4 / 5 ml	1 / 2 ml	4 / 5 ml
Width x length x height*) [mm]	127.8 x 85.5 x 30.0	127.8 x 85.5 x 52.5	127.8 x 85.5 x 88.5
Material	polypropylene	polypropylene	polypropylene
Rack colour	black	black	black
Lid profile	w/o lid	low (natural)	high (natural)
Coding option	2-D code on bottom and / or linear barcode on S1 side as specified in order form **F010 898**		
Quantity per bag/case	5/20	20	15

*) including lid

81-way Datamatrix Cryo Rack

With the 81-way storage box for Cryo.s™ with Datamatrix, Greiner Bio-One provides an optimal solution for the storage of Cryo.s™ in freezers and liquid nitrogen tanks set up for the classic cryo box format of 133 x 133 mm. Scanning windows underneath each tube position enable readability of all tube IDs in a single scan. The storage box for Cryo.s™ with Datamatrix is made of high-quality polycarbonate, thus endowing the product with highly shock-proof and temperature-resistant characteristics. Each box offers space for 81 Cryo.s™ with Datamatrix. For box closure optional lids for small (1 or 2 ml working volume) and large (4 ml working volume) Cryo.s™ are available. Rotation stoppers at the bottom of each tube position prepare the box for usage with customised automated de-/recapping devices.

802 576

New

81-way Datamatrix Cryo Rack

Cryo.s™ p. 191-192

48-way Datamatrix Cryo Rack p. 196-197

- Footprint 133 mm x 133 mm
- Shock-proof and temperature-resistant polycarbonate
- Choice between two lid types:
  Low profile for 1 and 2 ml Cryo.s™
  High profile for 4 ml Cryo.s™
- Scanning windows at bottom of each tube position
- Stacking feature and rotation stoppers

Cat.-No.	802 576	802 506
Description	Datamatrix Cryo Rack	Datamatrix Cryo Rack
Capacity	81 tubes	81 tubes
Compatible for Cryo.s™	1 / 2 ml	4 ml
Width x length x height*) [mm]	133 x 133 x 52	133 x 133 x 88
Material	polycarbonate	polycarbonate
Rack colour	black	black
Lid profile	low (natural)	high (natural)
Quantity per bag/case	1/10	1/10

*) including lid

Cryo.s™ Biobanking Tubes and 96-way Datamatrix Cryo Rack with ANSI footprint

With the new Cryo.s™ Biobanking Tubes, Greiner Bio-One offers an ideal solution for the efficient storage of biological samples in large-scale biorepositories. Cryo.s™ Biobanking Tubes are available with working volumes of 235 µl, 580 µl and 975 µl and offered in highly automation-friendly 96-way racks. The innovative design of tubes and racks allows for a very space-efficient storage with up to 30 % better utilisation of storage space in freezers or liquid nitrogen tanks. In addition, Cryo.s™ Biobanking Tubes are optimised for sample storage at extremely low temperatures (-80 °C, -150 °C and above liquid nitrogen) over long periods of time. Cryo.s™ Biobanking Tubes are made of high-quality polypropylene without leachables that could diffuse from the polymer into the stored sample. With the excellent purity of Cryo.s™ Biobanking Tubes and their innovative, space-saving and automation-friendly design Greiner Bio-One sets standards in the field of sample tubes for biobanking.

! Further information on Cryo.s™ Biobaning Tubes and compatible automated equipment

→ **Cryo.s™ with Datamatrix Code – Intelligent Solutions for Biobanking** (F073 788)

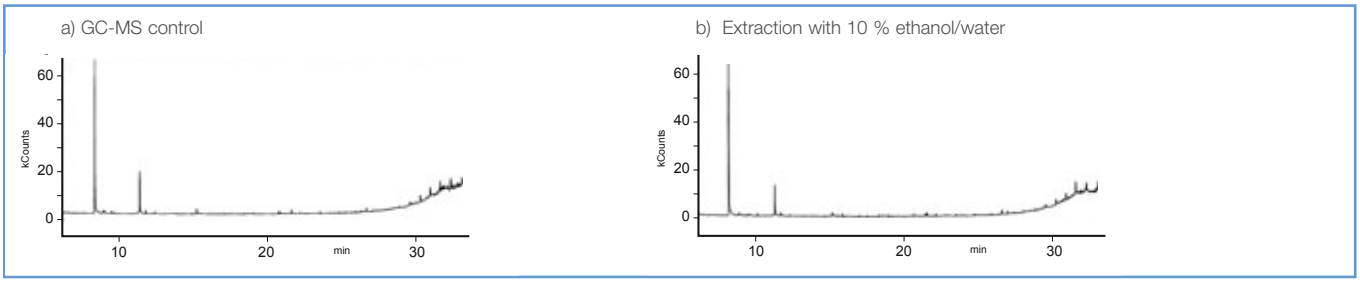


Figure 1: Cryo.s™ were extracted with 10 % ethanol in ultra-pure water. The extract was analysed applying gas chromatography with subsequent mass spectroscopy of the individual fractions. No extractable substances could be detected. Additionally, the absence of leachables was confirmed using 10 % DMSO in water as eluent (not shown).

Cryo.s™ Biobanking Tubes 96-way Datamatrix Cryo Rack

→ Cryo.s™ p. 191-192

→ **Manual decapper available on request (Cat.-No. 979 199)**

Cryo.s™ Biobanking Tubes

- Height-reduced screw cap conserving up to 30 % freezer space
- Ultra-sharp Datamatrix code
- Laser-written Datamatrix for improved durability and resistance to chemicals
- 100 % production control of readability and uniqueness of Datamatrices
- ECC200 Datamatrix code with Reed-Solomon algorithm for error correction
- Preproduced, unique Datamatrix codes off the shelf or customised code sequences on request **(F071 003)**
- Leachable-free, medical grade and USP class VI certified polypropylene
- Medical grade silicone gasket providing optimum seal
- Suitable for air shipment (IATA conformity)
- ANSI 1-2004 standard footprint rack for automated handling
- Manual capping aid for contamination-free manual capping and decapping
- Linear barcode 128 and corresponding Datamatrix code on each rack providing unique rack identification

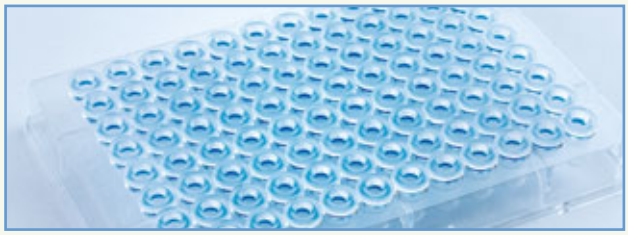


Figure 2: Cap carrier: 96 well microplate with 96 pre-installed screw caps (one per well). The cap carrier may be used as a depot for screw caps in automated capping/de-capping devices (e.g. LabElite DeCapper from Hamilton). The cap carrier may also serve as a convenient screw cap supply for manual work with uncapped tubes.

Free of detectable DNase, RNase, human DNA
non-pyrogenic
non-cytotoxic

Cryo.s™ Biobanking Tubes

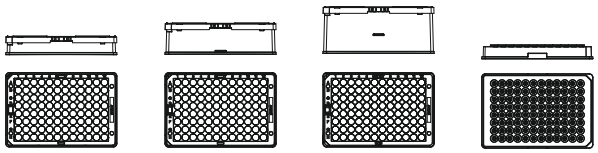
Description	300 µl Cryo.s™ Biobanking Tube with screw cap	600 µl Cryo.s™ Biobanking Tube with screw cap	1000 µl Cryo.s™ Biobanking Tube with screw cap
Working volume [µl]	235	580	975
ø x height [mm]	8.8 x 18.7	8.8 x 33.3	8.8 x 50.8
Thread	internal	internal	internal
Material	polypropylene	polypropylene	polypropylene
Coding option	2-D code	2-D code	2-D code

Cat.-No.	**976 570**	**976 580**	**976 561**	**131 202**	**131 263**
Description	300 µl tubes	300 µl tubes	300 µl tubes	300 µl tubes	300 µl tubes
Working volume [µl]	235	235	235	235	235
Thread	internal	internal	internal	internal	internal
Screw cap	-	natural	natural	natural	natural
Sterile	-	-	+	-	+
Coding option	Preproduced unique 14 x 14 Datamatrix code				
Quantity per packaging unit/case	96/960	96/960	96/960	480/960	480/960
Packaging unit	pre-racked	pre-racked	pre-racked	bulk	bulk

Cat.-No.	**977 570**	**977 580**	**977 561**	**132 202**	**132 263**
Description	600 µl tubes	600 µl tubes	600 µl tubes	600 µl tubes	600 µl tubes
Working volume [µl]	580	580	580	580	580
Thread	internal	internal	internal	internal	internal
Screw cap	-	natural	natural	natural	natural
Sterile	-	-	+	-	+
Coding option	Preproduced unique 14 x 14 Datamatrix code				
Quantity per packaging unit/case	96/960	96/960	96/960	192/960	192/960
Packaging unit	pre-racked	pre-racked	pre-racked	bulk	bulk

Cat.-No.	**978 570**	**978 580**	**978 561**	**133 202**	**133 263**
Description	1000 µl tubes	1000 µl tubes	1000 µl tubes	1000 µl tubes	1000 µl tubes
Working volume [µl]	975	975	975	975	975
Thread	internal	internal	internal	internal	internal
Screw cap	-	natural	natural	natural	natural
Sterile	-	-	+	-	+
Coding option	Preproduced unique 14 x 14 Datamatrix code				
Quantity per packaging unit/case	96/960	96/960	96/960	192/960	192/960
Packaging unit	pre-racked	pre-racked	pre-racked	bulk	bulk

96-way Datamatrix Cryo Rack & Cap Carrier



Cat.-No.	**976 501**	**977 501**	**978 501**	**385 270**
Description	Datamatrix Cryo Rack	Datamatrix Cryo Rack	Datamatrix Cryo Rack	Cap carrier with 96 screw caps
Capacity	96 tubes	96 tubes	96 tubes	96 screw caps / cap carrier
Compatible with Cryo.s™	300 µl	600 µl	1000 µl	300 / 600 / 1000 µl
Height*) [mm]	19.1	33.7	51.4	16.2
Material	polycarbonate	polycarbonate	polycarbonate	polystyrene
Colour	black	black	black	clear
Lid	+	+	+	-
Coding option	Preproduced unique 2-D code and code 128			-
Quantity per case	10	10	10	10

*) Height of rack without lid including tubes

12 Lids / Sealers / CapMats

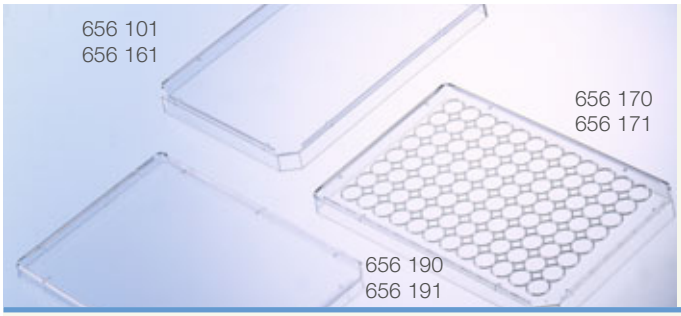
Lids **204**
Polystyrene Lids 204

Sealers **205**
EASYseal™ 205
SILVERseal™ 205
VIEWseal™ 206
AMPLIseal™ 206
BREATHseal™ 208

CapMats **209**
Ethyl Vinyl Acetate CapMats 209

Lids

Polystyrene Lids



Polystyrene Lids

High Profile / Low Profile / Ultra Low Profile

Cell Culture Microplates p. 24-30

HTS Microplates p. 71-85

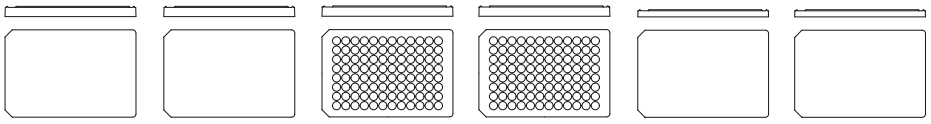
- All sterile lids are non-cytotoxic

Lids offer protection against contamination and evaporation during sample storage and cell cultivation. Four different polystyrene lids are available:

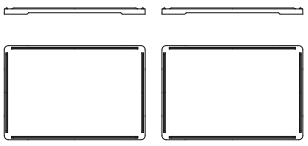
1. High profile lids (9 mm)
High profile without condensation rings is mainly used for non TC-treated 96 well microplates.
2. High profile lids (9 mm) with condensation rings
High profile with condensation rings is recommended for cell culture applications, since it ensures an optimum oxygen supply to cultivated cells due to improved gas exchange.
3. Low profile lids (6 mm)
Low profile is particularly recommended for 384 well standard microplates as the well contents are protected against evaporation and contamination, and the covered microplates can be easily gripped on the side in automated processes.

4. Universal ultra low profile lids
The ultra low profile lid has a universal design, and is compatible with a whole range of different microplates. In particular high-format low profile microplates, such as the 384 well Small Volume™ LoBase or the 1536 well microplate can be sealed with the ultra low profile lid. This lid provides the greatest possible protection against evaporation, and is also suitable for use in automated systems. Recesses in the edge of the lid improve the readability of barcodes, and sealed microplates can be easily gripped from the side and transported without problem.

Free of detectable DNase, RNase, human DNA
non-pyrogenic



Cat.-No.	656 101	656 161	656 170	656 171	656 190	656 191
Description	lid	lid	lid	lid	lid	lid
Lid profile / height [mm]	high / 9	high / 9	high / 9	high / 9	low / 6	low / 6
Condensation rings	-	-	+	+	-	-
Sterile	-	+	-	+	-	+
Quantity per bag/case	1/100	1/100	1/100	1/100	20/200	20/200



Cat.-No.	691 101	691 161
Description	lid	lid
Lid profile	ultra low	ultra low
Condensation rings	-	-
Sterile	-	+
Quantity per bag/case	5/100	5/100

Sealers

Many applications in immunology, molecular biology, high-throughput screening or cell culture require tightly sealed microplates. Adhesive sealers are an interesting alternative to heat sealing systems or CapMats. They are easy to use and there is a lower risk of cross-contamination because they are used as disposable products.

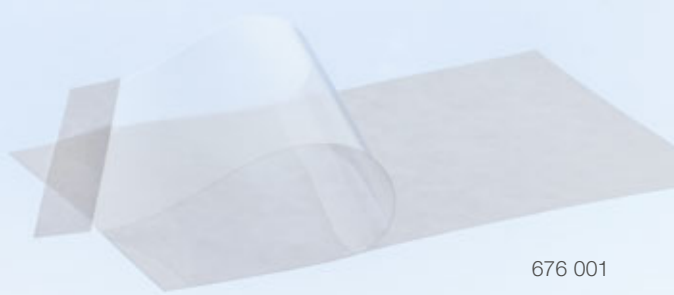
Five different sealers are available which can be divided into two different classes on the basis of the adhesive used.

The classical sealers such as EASYseal™, AMPLIseal™, SILVERseal™ and BREATHseal™ are coated with an acrylate adhesive. The advanced sealer VIEWseal™ is coated with a pressure-sensitive silicone adhesive.

! Further information on sealers

→ **Forum No. 6: Sealers for microplates and their areas of application in molecular biology and cell culture** (F073 013)

EASYseal™ and SILVERseal™

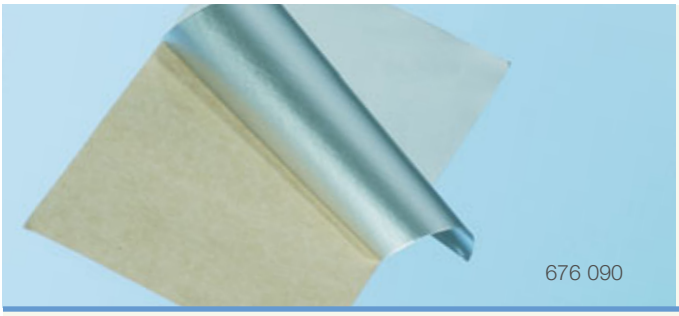


676 001

EASYseal™

- Coverage / storage of microplates
- Protection against evaporation / contamination
- Suitable for optical measurements

Cat.-No.	**676 001**
Special feature	transparent
Sterile	-
Quantity per bag/case	100



676 090

SILVERseal™

- Pierceable aluminium foil coated with an acrylate adhesive
- Temperature-resistant from -80 °C to +110 °C
- Ideal for PCR applications
- Ideal for the storage of sample material and active agents

SILVERseal™ is coated with an acrylate adhesive (Fig. 1) which remains flat when removed from its paper backing, and can thus be easily applied to all microplate types. A double perforation makes it possible to tear off the projecting adhesive sealer and thus improves the stacking of sealed microplates.

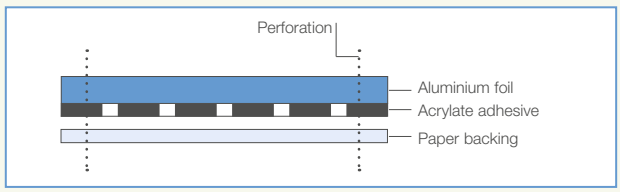
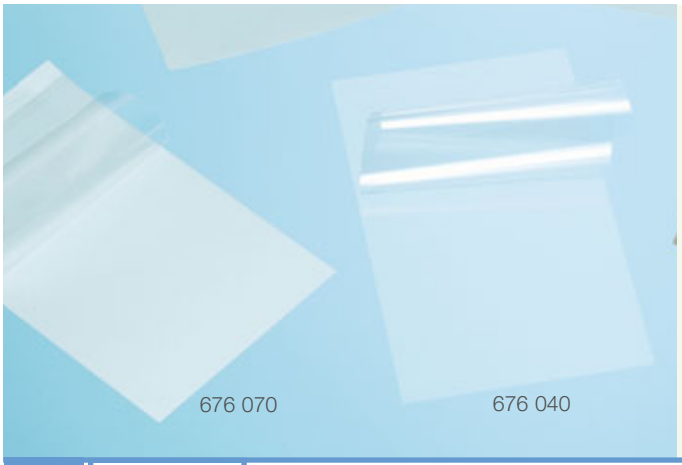


Figure 1:
Structure of SILVERseal™

PCR | Free of detectable DNase, RNase, human DNA | non-pyrogenic

Cat.-No.	**676 090**
Special feature	aluminium foil
Sterile	-
Quantity per bag/case	100

VIEWseal™ and AMPLIseal™



VIEWseal™ and AMPLIseal™

- Cell Culture Microplates p. 24-30
- HTS Microplates p. 71-85
- PCR Microplates p. 163-164

VIEWseal™
- Highly transparent film for precise optical measurements
- Ideally suited for protein crystallography

AMPLIseal™
- Highly transparent film with minimal autofluorescence
- Ideal for Real Time PCR

PCR | Free of detectable DNase, RNase, human DNA | non-pyrogenic

Cat.-No.	676 070	676 040
Description	VIEWseal™	AMPLIseal™
Special feature	transparent	transparent
Sterile	-	-
Quantity per bag/case	100	100

VIEWseal™

VIEWseal™ (Fig. 2 and Fig. 3) is an adhesive sealing film coated with a silicone adhesive which only sticks when the film surface is pressed on. Thus the sealing film is easy to work with, even when wearing gloves (The film does not adhere to gloves). Substances in powder form and biological model organisms like *Drosophila melanogaster* or *Caenorhabditis elegans* also do not stick to vessels sealed with VIEWseal™.
VIEWseal™ withstands heating at +100 °C and tolerates cold temperatures down to -70 °C and is therefore suitable for PCR applications (Fig. 4) and sample storage.
VIEWseal™ stands out over EASYseal™ and AMPLIseal™ through its exceptionally high optical transparency also in the shorter wavelength range (< 340 nm) (Fig. 6). The transparency of VIEWseal™ is accompanied by minimal auto-fluorescence. VIEWseal™ is thus especially well suited for microscopic applications, such as the detection of protein crystals in protein crystallography.

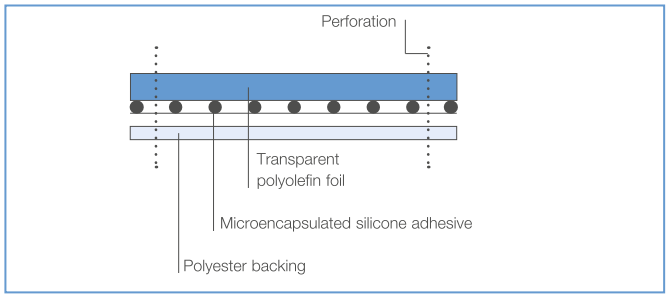


Figure 2:
Structure of VIEWseal™

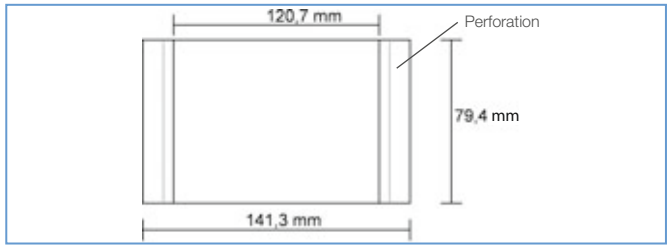


Figure 3:
External dimensions of SILVERseal™, VIEWseal™ and AMPLIseal™

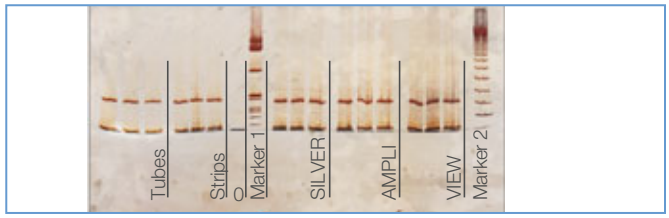


Figure 4:
Comparison of PCR products from classical thin wall tubes (tubes/strips) with PCR products from 96 well polypropylene microplates covered with a sealer

AMPLIseal™

AMPLIseal™ is a self-adhesive sealing film notable for its low autofluorescence, in particular in the wavelength range critical for Real Time PCR (Fig. 7). AMPLIseal™ consists of a 51 µm thick polypropylene film coated with a highly transparent acrylate adhesive. The adhesive layer is protected by a peelable polyester film. The strongly adhering acrylate adhesive provides a reliable sealing of the microplate, thereby minimising evaporation but without influencing the PCR reactions or the fluorescence measurements. AMPLIseal™, with external dimensions of 141.3 mm x 79.4 mm, covers PCR microplates with a skirt and all other microplates with a standard microplate footprint. Protruding extra film can be removed without problem with a double perforation.

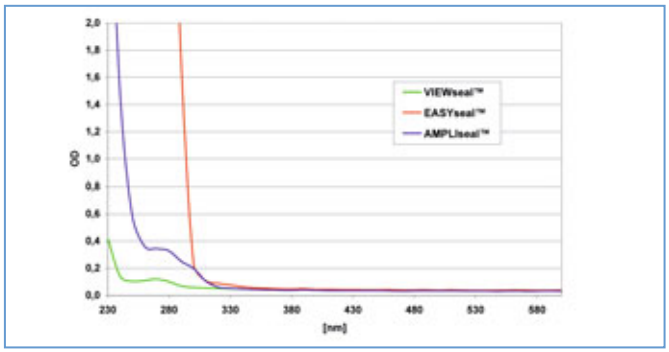


Figure 6:
Light absorption of VIEWseal™, EASYseal™ and AMPLIseal™

Figure 5:
Microscopic detection of protein crystals with polarised light through AMPLIseal™

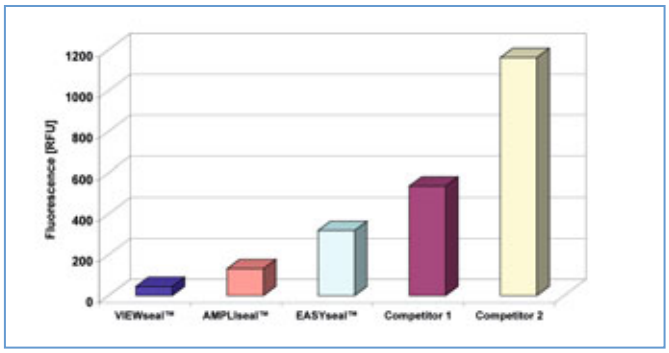


Figure 7:
Autofluorescence of AMPLIseal™ compared to VIEWseal™ and other sealing films. The wavelength combination used (479 nm / 520 nm) corresponds to the excitation and emission maximum of SybrGreen

BREATHseal™

BREATHseal™

Cell Culture Microplates p. 24-30
HTS Microplates p. 71-85

- Gas-permeable, pierceable membrane coated with acrylate adhesive
- Ideal for cultivating bacteria, yeast or cells
- Available non-sterile or sterile

BREATHseal™ is a gas-permeable membrane coated with acrylate adhesive, consisting of heat-sealed rayon fibres. The pore size varies between 10 and 50 µm (Fig. 8). The pores are layered in such a way that the membrane acts as a filter, reliably ensuring that the contents of the wells are protected against airborne bacteria, while maintaining optimal oxygen supply.
BREATHseal™ is suitable for cultivating bacteria, yeast or cells in microplates. For a high cell yield, which in turn means a high DNA or protein yield, it is necessary that the organisms are optimally supplied with oxygen. The oxygen supply is limited in microplates sealed with a lid. The use of a gas-permeable sealer such as BREATHseal™ significantly improves cell growth (Fig. 9).

Figure 8:
Microscopic image of BREATHseal™ (10-fold magnification)

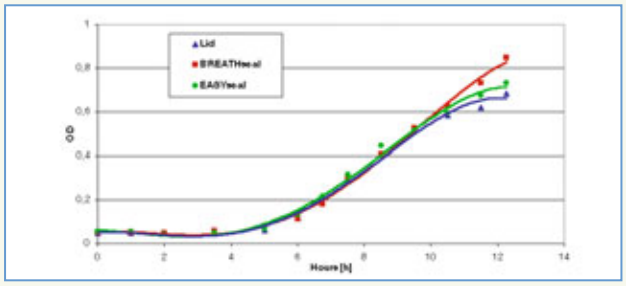


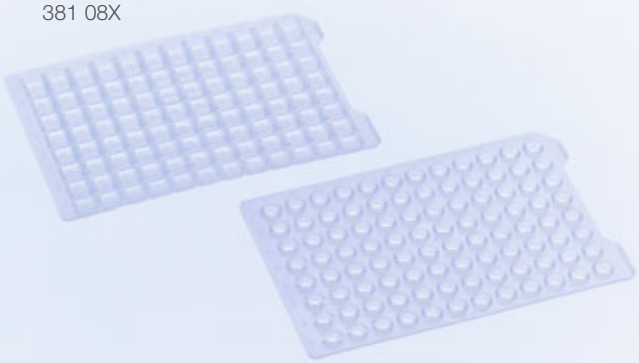
Figure 9:
Growth of *Escherichia coli* at 37 °C in MASTERBLOCK® sealed with BREATHseal™, EASYseal™ and lids

Cat.-No.	676 050	676 051
Special feature	gas-permeable	gas-permeable
Sterile	-	+
Quantity per bag/case	50/500	50/500

CapMats

Ethyl Vinyl Acetate CapMats

381 08X



381 061
381 070

Ethyl Vinyl Acetate CapMats

HTS Microplates p. 71-85

- Available for 96 well microplates and MASTERBLOCK®
- Available non-sterile or sterile

An alternative method for sealing 96 well plates are CapMats. The 96 well CapMats are made of ethyl vinyl acetate (EVA). They are resistant to DMSO and can be used in a temperature range between -20 °C and +60 °C.

- 96 well CapMats with **round** naps (Cat.-No. 381 070, 381 061) Both are suitable for sealing the 1 ml and 0.5 ml 96 well MASTERBLOCK®, in addition to standard 96 well polypropylene microplates. The 96 well F-, U- and µClear®-bottom polystyrene microplates may also be sealed (except 96 well V-bottom polystyrene microplates). These CapMats are not pierceable.
- 96 well CapMats with **square** naps (Cat.-No. 381 080, 381 081) Both are suitable for the 2 ml 96 well MASTERBLOCK®. These CapMats are not pierceable.

PCR | Free of detectable DNase, RNase, human DNA | non-pyrogenic

Cat.-No.	381 070	381 061	381 080	381 081
Description	96 well CapMat	96 well CapMat	96 well CapMat	96 well CapMat
Nap shape	round	round	square	square
Material	EVA	EVA	EVA	EVA
Pierceable	-	-	-	-
Sterile	-	+	-	+
Quantity per bag/case	10/50	1/50	10/50	1/50

13 Reaction Tubes / Analyser Cups

Analyser Cups **212**
Polystyrene Analyser Cups 212

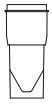
Reaction Tubes **213**
Reaction Tubes
– with Attached Cap 213
– with Screw Cap 213

Semi-micro / Macro Cuvette **214**
Semi-micro Cuvette 214
Macro Cuvette 214

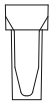
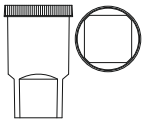
Analyser Cups

Analyser Cups

- Available for numerous established analytical systems, such as Technicon, Gemsaec, Hitachi, Coulter and Hycel analysers


Cat.-No.	620 101	621 171	624 101
Description	analyser cup	analyser cup	analyser cup
Material	polystyrene	polystyrene	polystyrene
Bottom design	conical	conical	conical
Support skirt	+	+	+
Volume [ml]	1.5	4	0.5
Cap, Cat.-No.	-	-	-
Suitable for	Technicon	Technicon	Gemsaec
Quantity per bag/case	500/6000	250/5000	500/6000

Cat.-No.	729 101	668 102
Description	analyser cup	analyser cup
Material	polystyrene	polystyrene
Bottom design	conical	flat
Support skirt	+	-
Volume [ml]	1.7	25
Cap	-	+
Suitable for	Hitachi	Coulter / Hycel
Quantity per bag/case	250/5000	250/1250

Reaction Tubes

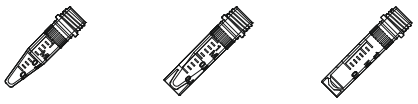
Reaction Tubes

- Overview: Max. Centrifuge Capacity in Technical Appendix
- Further Coloured Caps p. 136
- Coloured versions of Cat.-No. 623 201 available on request
- Sterile versions of Cat.-No. 717 201 and 722 201 (including cap) available on request

- High chemical and temperature resistance
- Available in different sizes
- Available for Eppendorf, Vitatron and Roche systems
- Brown reaction tube for light-sensitive materials
- Cat.-No. 616 2XX features a flat lid surface for easy labelling

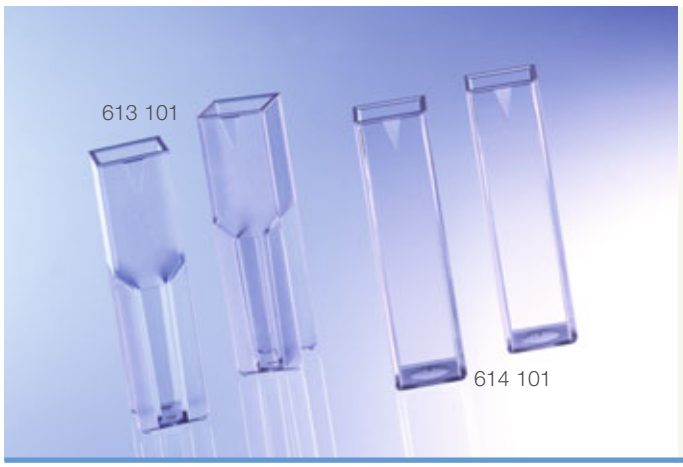
Free of detectable DNase, RNase, human DNA
non-pyrogenic

Cat.-No.	616 201	616 283	618 201	623 201	667 201	742 270
Description	reaction tube	reaction tube	reaction tube	reaction tube	reaction tube	“Cobas“ cup
Colour	natural	brown	natural	natural	natural	blue
Volume [ml]	1.5	1.5	1.5	2.0	0.5	0.7
Graduation	+	+	-	+	-	-
Cap, attached	+	+	-	+	+	+
Suitable for	Eppendorf	Eppendorf	Eppendorf	Eppendorf	Vitatron	Roche
Sterile	-	-	-	-	-	-
Quantity per bag/case	500/4000	500/4000	500/3000	500/4000	1000/10000	500/15000



Cat.-No.	716 201	717 201	722 201
Description	reaction tube	reaction tube	reaction tube
Volume [ml]	1.5	1.5	2.0
Graduation	+	+	+
Screw cap, Cat.-No.	366 XXX	366 XXX	366 XXX
Skirt	-	+	+
Sterile	-	-	-
Quantity per bag/case	500/5000	500/5000	500/5000

Semi-micro / Macro Cuvette



Semi-micro / Macro Cuvette

UV-Star® microplate for transmission range up to 230 nm p. 101

- Ideal for enzymatic determinations, since the very thin walls enable rapid and uniform equilibration
- Manufactured from crystal clear polystyrene
- Characterised by minimal light scatter but high transmission rate
- Applicable wavelength range from 340 to 900 nm

Cat.-No.	613 101	614 101
Description	semi-micro cuvette	macro cuvette
Total volume [ml]	1.6	4
Minimum working volume [ml]	0.95	2.5
Material	polystyrene	polystyrene
Outer dimensions: Length x width x height [mm]	12.5 x 12.5 x 45	12.5 x 12.5 x 45
Pathlength [mm]	10	10
Quantity per box/case	100/1000	100/1000

Notes

INFORMATION

Interested in larger vessels, tubes or tube caps?

Have a look at chapter 5 of our catalogue

- Tubes (p. 125-131)
- Closures (p. 136)

Or interested in PCR tubes and microplates?

Have a look at chapter 7 of our catalogue

- PCR Tubes (p. 160)
- PCR Microplates (p. 163-164)


80405318

14 Accessories

Disposal Bags **218**
Polypropylene Disposal Bags 218
Polyamide Disposal Bags 218

Media Bottles **219**

Barcode Service **220**
Linear Barcode Labelling of Microplates 220
Linear Barcode Labelling of Cryo.s™ 220

Disposal Bags

Disposal Bags

- Ideal for the hygienic disposal of contaminated laboratory items

Disposal bags made of **polypropylene** foil for sterilisation in the steam autoclave. On request disposal bags are also available with imprint **"Biohazard"** if a sufficient number is ordered. For users of hot-air sterilisers, disposal bags made of **polyamide** are available for use up to +160 °C.

Cat.-No.	643 201	644 201	646 201	649 201
Description	polypropylene	polypropylene	polypropylene	polypropylene
Width [mm] x length [mm]	300 x 500	400 x 780	600 x 780	700 x 1100
Foil thickness [mm]	0.05	0.05	0.05	0.05
Nominal capacity [l]	10	30	65	130
Suitable for steam autoclaves	+	+	+	+
Quantity per case	500	500	500	350

Cat.-No.	643 401	644 401	646 401	649 401
Description	polyamide	polyamide	polyamide	polyamide
Width [mm] x length [mm]	300 x 500	400 x 780	600 x 780	700 x 1100
Foil thickness [mm]	0.05	0.05	0.05	0.05
Nominal capacity [l]	10	30	65	130
Suitable for hot-air sterilisers	+	+	+	+
Quantity per case	500	500	300	200

Media Bottles

Media Bottles

- Made of polyethylene terephthalate (PET)
- Available in three sizes
- Sterilised by irradiation
- With graduation
- Triple-packed for GMP-compliant workflow

Free of detectable DNase, RNase, human DNA
non-pyrogenic

non-cytotoxic

Cat.-No.	951 700	950 700	952 700
Description	media bottle	media bottle	media bottle
Design	tetragonal	tetragonal	tetragonal
Volume [ml]	100	500	1000
Sterile	+	+	+
Quantity per bag/case	100	50	24

Barcode Service

Linear Barcode Labelling of Microplates and Cryo.s™

When large quantities of samples and information are being processed, automated identification offers an efficient means of organisation and management. The application of individual linear barcodes on microplates or Cryo.s™ represents a rapid and easy method to facilitate identification, handling and storage of biological and medical samples. Machine-readable labels with linear barcodes can be implemented in any workflow system, thereby decreasing the risk of manual transcription errors as well as the time and cost involved with sample management.

Microplates and Cryo.s™ with Linear Barcodes

- Cell Culture Microplates p. 24-30
- Microplates p. 70-101
- Cryo.s™ p. 191-192
- Cryo.s™ with Datamatrix Code p. 195-201

Barcoded Microplates:

- Adhesive labels in different sizes
- Automated processes can be used to attach labels at given specifications on outer perimeter microplate sidewalls
- Product options include 96, 384 or 1536 well microplates made of polypropylene, polystyrene, COC, and other materials
- Pre-printed barcode labels can also be supplied in rolls
- Labels are resistant to solvents, temperature fluctuations and smudging. Reading accuracy is ensured
- Low minimum order requirement

Barcoded Cryo.s™:

- Direct print on Cryo.s™ suitable for storage at cryogenic temperatures (-196 °C)
- Print is solvent-resistant to ethanol (up to 70 %) and DMSO (up to 50 %)
- Availability of all prevalent barcode symbologies (e.g. Code 128, Code 39, 2/5 interleaved, EAN, HIBC) in various tube sizes (1 ml, 2 ml, 4 ml or 5 ml Cryo.s™ with internal or external thread)
- Screw cap colour can be chosen as desired
- Low minimum order requirement of one original Cryo.s™ tube box
- Packaging: 1 ml and 2 ml Cryo.s™ containing 100 items/bag; 4 ml and 5 ml Cryo.s™ containing 50 items/bag
- Prospective number sequence on bag and box
- With 100 or 150 coding caps per original box

! To obtain the separate order forms for microplates and Cryo.s™ with barcodes, please call us on (+49) 7022-948-0 or download them directly from the Download Center on our homepage www.gbo.com

Cat.-No.	F071 085	F073 015	F071 006
Description	Barcode ABC	order form	order form
		microplates with barcode	Cryo.s™ with barcode

Notes

INFORMATION

Interested in Barcodes?

Have a look at chapter 11 of our catalogue

- Cryo.s™ with Datamatrix for Biobanking (p. 195-201)

Barcode Literature

- Cryo.s™ with Datamatrix Code – Intelligent Solutions for Biobanking (F073 788)
- Forum No. 10: Datamatrix coding for sample identification with Cryo.s™ sample storage tubes (F071 008)
- Forum No. 14: Cryo.s™ with Datamatrix and the novel Datamatrix Cryo Rack – automation and biobanking (F073 116)

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Quality Standards at Greiner Bio-One

Greiner Bio-One is certified according to the international standards DIN EN ISO 9001 and EN ISO 13485 for Medical Devices. Since 2013, Greiner Bio-One Frickenhausen (Germany) is also certified according to DIN EN ISO 50001 (systematic energy management). On the right you can find the corresponding certificates.

DIN EN ISO 9001 Certification

EN ISO 13485 Certification

DIN EN ISO 50001 Certification

Technical appendix is subject to error and technical modifications.

Catalogue Overview Microplates

All Greiner Bio-One microplates listed in this catalogue are summarised with their respective page number below.

96 Well Microplates

Bottom	Colour	Well profile	Optical bottom base		Surface Quality											
			µClear® bottom base	glass bottom base	TC treated, sterile	Advanced TC™, sterile	sterile	non-sterile	med. binding	high binding, sterile	non-binding	cell-repel-lent	Strepta-vidin-coated	Poly-D-Lysine	Poly-L-Lysine	Collagen Type I
Polystyrene																
solid	clear	U			24		24,71	71	107	107	95	51				
		V			24		71	71	107	107	95					
		F standard					71	71	107	107						
		F chimney			24	41	24		107	107	95	51		46	47	44
		F half area			26		73	73	107	107						
		C											97			
	white	F chimney			25				72	72	95					
		F half area			26				73	73						
		C											97			
	black	F chimney			25				72	72	95					
		F half area			26				73	73						
		C											97			
optical	white	F chimney	•		26	41			72	72	95			46		
		F half area	•		26	41			73							
	black	F chimney	•		26	41			72	72	95			46	47	44
		F half area	•		26	41			73							
		F chimney		•	99		99									
UV-Star®																
optical	clear	F chimney	film					101								
		F half area	film					101								
Polypropylene																
solid, standard microplate	natural	U chimney					75	75								
		F chimney						75								
		V chimney						75								
	white	U chimney						75								
		F chimney						75								
	black	U chimney						75								
		F chimney						75								
		V chimney						75								
solid, MASTERBLOCK® 0.5 ml	natural	V					88	88								
solid, MASTERBLOCK® 1 ml	natural	U					87	87								
solid, MASTERBLOCK® 2 ml	natural	V					88	88								
Cycloolefin																
optical	black	F chimney	CO film		55											

384 Well Microplates

Bottom	Colour	Well profile	Optical bottom base		Surface Quality										
			µClear® bottom base	glass bottom base	TC-treated, sterile	Advanced TC™, sterile	sterile	non-sterile	med. binding	high binding, sterile	non-binding	Streptavidin-coated	Poly-D-Lysine	Poly-L-Lysine	Collagen Type I
Polystyrene															
solid	clear	F-bottom			27		77	77		77	96	97	46	47	44
		Small Volume™ HiBase						81							
		Small Volume™ LoBase					81	81							
	white	F-bottom			27				77	77	96	97	46		
		Small Volume™ HiBase			28				81		96				
		Small Volume™ LoBase			28				81						
	black	F-bottom			27				77	77	96	97			
		Small Volume™ HiBase			28				81		96		46		
		Small Volume™ LoBase			28				81						
optical	white	F-bottom	•		28	41			78	78	96		46		
		Small Volume™ LoBase	•		28	41			81						
	black	F-bottom	•		28	41			78	78	96		46	47	44
		Small Volume™ HiBase	•												
		Small Volume™ LoBase	•		28	41			81						
		F-bottom		•			99								
		Small Volume™ LoBase		•			99								
		F-bottom extra LoBase		•				99							
UV-Star®															
optical	clear	F-bottom	film					101							
Polypropylene															
solid, standard microplate	natural	F-bottom						79							
		V-bottom						79							
		Deep Well Small Volume™						82							
	white	F-bottom						79							
		V-bottom						79							
	black	F-bottom						79							
		V-bottom						79							
solid, MASTERBLOCK®	natural	V-bottom, Deep Well					90	90							
solid, deionised storage plate	natural	F-bottom						93							
Cycloolefin															
solid	clear	Small Volume™						93							
optical	black	F-bottom	CO film		55										

Technical appendix is subject to error and technical modifications.

1536 Well Microplates

Bottom	Colour	Well profile	Optical bottom base		Surface Quality						
			µClear® bottom base	glass bottom base	TC treated, sterile	sterile	non-sterile	med. binding	high binding, sterile	non-binding	Poly-D Lysine
Polystyrene											
solid	clear	F-bottom HiBase			29		84		84		
		F-bottom LoBase					85				
	white	F-bottom HiBase			29			84	84	96	
		F-bottom LoBase						85			
	black	F-bottom HiBase			29			84	84	96	
		F-bottom LoBase						85			
optical	white	F-bottom HiBase	•		29			84	84		
		F-bottom LoBase	•		30			85			
	black	F-bottom HiBase	•		29			84	84		46
		F-bottom LoBase	•		30			85			
		F-bottom HiBase		•		99					
		F-bottom LoBase		•		99					
		F-bottom extra LoBase		•			99				
Polypropylene											
	natural	V-bottom, Deep Well				91	91				
Cycloolefin											
solid	clear	F-bottom					93				
		F-bottom (Novartis Design)					93				
	black	F-bottom HiBase					85				
optical	black	F-bottom	CO film		55						

General Information for the Lab

Chemical Resistance of Various Materials

	PS 20 °C	PS 50 °C	PP 20 °C	PP 50 °C	HDPE 20 °C	HDPE 50 °C	LDPE 20 °C	LDPE 50 °C	PC 20°	PC 50°
Acetic acid 10 %	1	1	1	1	1	1	1	1	1	2
Acetic acid 50 %	2	2	1	1	1	1	1	1	1	2
Acetic acid 90 %	4	4	1	2	1	1	1	2	4	4
Acetone	4	4	1	3	1	1	3	3	4	4
Acetonitrile	4	4	3	4	1	1	1	1	4	4
Ammonia 25 %	2	2	1	1	1	1	1	1	4	4
Ammonium acetate	1	1	1	1	1	1	1	1	1	1
Amyl alcohol	1	1	1	1	1	1	1	2	1	-
Ascorbic acid	-	-	1	1	1	-	1	-	2	2
Benzene	4	4	4	4	4	4	4	4	4	4
Benzyl alcohol	4	4	4	4	3	4	4	4	4	4
Boric acid 10 %	1	1	1	1	1	1	1	1	1	1
Carbon tetrachloride	4	4	4	4	3	4	4	4	4	4
Carbonic acid	1	1	1	1	1	3	1	1	1	-
Chloroform 100 %	4	4	3	4	3	-	3	-	4	4
Citric acid 10 %	1	1	1	1	1	1	1	1	1	2
Cyclohexanol	3	3	1	3	1	1	1	1	3	-
Detergents	-	-	1	1	-	-	-	-	-	-
Dichloroacetic acid	-	-	1	1	1	1	-	-	4	4
Diethyl ether	4	4	4	4	3	4	4	4	4	4
Dimethyl acetamide	4	4	1	1	1	1	3	4	-	-
Dimethylsulfoxide (DMSO)	1	2	1	1	1	1	1	1	4	4
Emulsifier	-	-	1	1	-	-	-	-	-	-
Ethanol 50 %	1	1	1	-	1	1	1	2	1	1
Ethanol 96 %	1	1	1	1	1	-	1	-	1	3
Ether	4	4	4	4	3	4	4	4	4	4
Formaldehyde 10 %	3	4	1	1	1	1	1	1	1	2
Formaldehyde 40 %	4	4	1	2	1	2	2	3	1	2
Formamide	1	1	1	1	1	1	1	1	3	3
Formic acid 50 %	3	3	1	2	1	1	1	2	3	3
Glucose	1	1	1	1	1	1	1	1	1	1
Glycerine	1	1	1	1	1	1	1	1	3	3
Heptane	4	4	3	3	2	3	3	4	1	2
Hexanol	-	-	1	-	1	-	1	-	2	2
Hydrochloric acid 20 %	1	1	1	1	1	1	1	1	2	3
Hydrochloric acid conc.	3	3	1	1	1	1	1	1	4	4
Hydrogen peroxide 3 %	1	1	1	1	1	1	1	1	3	3
Hydroquinone	4	4	1	-	-	-	1	3	3	3
Isoamyl alcohol	1	1	-	-	-	-	-	-	3	0
Isobutanol	2	2	1	1	1	1	1	1	1	2
Isopropanol	2	2	1	1	1	1	1	1	1	2
Isopropyl acetate	4	4	2	3	1	2	2	3	4	4
Isopropyl benzene	4	4	3	4	2	3	3	4	4	4
Isopropyl ether	4	4	4	4	4	4	4	4	4	4
Lactic acid 3 %	2	2	1	2	1	1	1	2	1	2
Lactic acid 85 %	2	2	1	2	1	1	1	1	1	2
Liquid paraffin	1	1	1	3	1	1	1	3	1	-
Methanol	3	4	1	1	1	1	1	1	4	4
Methyl acetate	4	4	2	3	3	3	3	4	4	4
Methyl phenyl ether 100 %	4	4	3	-	-	-	3	-	4	4
Methyl propyl ketone	4	4	2	3	1	2	2	3	4	4

1 = resistant 2 = limited resistant 3 = moderate resistant 4 = no resistance
This table is a general guide only. As many factors can affect the chemical resistance of a given product, its suitability for a specific application should be tested.

Chemical Resistance of Various Materials

	PS 20 °C	PS 50 °C	PP 20 °C	PP 50 °C	HDPE 20 °C	HDPE 50 °C	LDPE 20 °C	LDPE 50 °C	PC 20°	PC 50°
Methylamine 32 %	-	-	1	-	1	-	1	-	4	4
Methylene chloride	4	4	3	4	4	4	4	4	4	4
Naphthalene	-	-	1	-	1	3	-	-	3	3
Nitrobenzene	4	4	4	4	3	4	4	4	4	4
Oxalic acid	1	1	1	1	1	1	1	1	3	4
Ozone	3	3	1	2	1	1	1	2	1	2
Palmitic acid	1	1	3	4	3	-	2	-	2	2
Phenol 10 %	4	4	1	1	1	1	1	1	4	4
Phenol 100 %	4	4	1	1	2	3	3	3	4	4
Phosphoric acid 1 – 5 %	2	2	1	1	1	1	1	1	1	1
Phosphoric acid 85 %	1	1	1	2	1	1	1	1	1	2
Phthalic acid	1	1	1	1	1	1	1	1	3	3
Potassium carbonate	1	1	1	1	1	1	1	1	3	3
Potassium chromate	1	1	1	1	1	1	1	-	2	2
Potassium permanganate	2	3	1	1	1	1	1	1	1	-
Propanol	3	3	1	1	1	1	1	1	1	-
Sodium acetate	2	2	1	1	1	1	1	1	1	2
Sodium chloride	1	1	1	1	1	1	1	1	1	1
Sodium hydroxide 30 %	1	1	1	1	1	1	1	1	4	4
Sodium hydroxide 45 %	1	1	1	1	1	1	1	1	4	4
Sodium hydroxide 60 %	1	1	1	1	-	-	-	-	4	4
Sodium hypochloride	1	1	2	3	2	3	2	3	2	3
Sodium permanganate	2	3	1	1	1	1	1	1	-	-
Sodium thiosulfate	1	1	1	1	1	1	1	1	2	2
Stearic acid	1	2	1	1	1	1	1	1	1	2
Sulphuric acid 1 – 6 %	1	2	1	1	1	1	1	1	1	1
Sulphuric acid 60 %	2	4	1	3	1	3	1	3	3	3
Sulphuric acid conc.	4	4	4	4	4	4	4	4	4	4
Tannin acid	1	1	1	1	-	-	-	-	3	3
Terpentine oil	-	-	-	-	3	4	3	4	4	4
Tetrahydrofuran	4	4	3	4	3	4	4	4	4	4
Toluene	4	4	3	4	3	4	3	4	4	4
Trichloroacetic acid	4	4	3	4	3	3	3	4	4	4
Urea	1	2	1	1	1	1	1	1	1	1
Uric acid	-	-	1	-	1	-	1	-	1	-
Urine	3	3	1	1	1	1	1	1	1	-
Xylene	4	4	4	4	2	3	2	4	4	4

1 = resistant 2 = limited resistant 3 = moderate resistant 4 = no resistance
This table is a general guide only. As many factors can affect the chemical resistance of a given product, its suitability for a specific application should be tested.

Chemical Resistance of Cycloolefins (COC / COP)

	Cycloolefin		Cycloolefin		Cycloolefin
Acetic acid 99 %	1	Dibutyl ether	4	Isopropanol	1
Acetone	1	Dichloroethane	4	Methanol	1
Acrylonitrile	1	Dichloromethane	4	Methylene chloride	4
Ammonia 33 %	1	Diethyl ether	4	Nitric acid (HNO_3)	1
Benzaldehyde	3	Dimethyl sulfoxide	1	Octane	4
Benzene	4	DMSO	1	Pentane	4
Benzine	4	Ethanol 50 %	1	Sodium hydroxide (NaOH) 50 %	1
Butanon	1	Ethanol 96 %	1	Sulphuric acid (H_2SO_4) 40 %	1
Carbon tetrachloride	4	Fatty acid	4	Sulphuric acid (H_2SO_4) 95 %	1
Chloroform	4	Heptane (n-Heptane)	4	Toluene	4
Cyclohexane	4	Hexane	4	Xylene	4
Cyclohexanone	4	Hydrochloric acid (HCl) 36 %	1		
Detergents	1	Hydrogen peroxide water 30 %	1		

1 = resistant 2 = limited resistant 3 = moderate resistant 4 = no resistance
This table is a general guide only. As many factors can affect the chemical resistance of a given product, its suitability for a specific application should be tested.

Chemical Resistance of Polyethylene Terephthalate (PET) Capillary Pore Membranes (ThinCert™ Cell Culture Inserts)

Acetaldehyde	1	Ethanol	1	Monochlorbenzene	1
Acetic acid (10 %)	1	Ethyl acetate	1	Nitric acid (30 %)	1
Acetic acid (100 %)	3	Ethyl ether	1	Nitrobenzene	1
Acetone	1	Ethylendichloride	1	Nitropropane	1
Ammonium hydroxide (5 %)	1	Ethylene glycol	1	n-Propanol	1
Amyl acetate	1	Fluoric acid (35 %)	1	Pentane	1
Amyl alcohol	1	Formaldehyde	1	Perchlorethylene	1
Aniline	1	Formic acid (50 %)	1	Petroleum ether	1
Benzene	3	Freon	1	Phosphoric acid (85 %)	3
Benzyl alcohol	1	Glutaraldehyde	1	Potassium hydroxide	4
Benzyl benzoate	1	Glycerol	1	Propyl acetate	1
Boric acid (5 %)	1	H_2O_2 (30 %)	1	Pyridine	1
Butanol	1	Halogenated phenoles	4	Silicon oil	1
Butyl acetate	1	Hexane	1	Sodium hydroxide	4
Butyl cellusolve	1	Hydrochloric acid (20 %)	1	Sulphuric acid (25 %)	1
Carbon tetrachloride	1	i-Propanol	1	Terpentine oil	1
Chloroform	1	Isopropyl myristate	1	Tetrahydrofurane	1
Concentrated strong acids	4	Methanol	1	Tetraline	1
Cyclohexane	1	Methyl acetate	1	Toluene	3
Cyclohexanone	3	Methyl cellusolve	1	Trichlorbenzene	1
Dekaline	1	Methylenchloride	3	Trichlorethylene	1
Dimethylacetamide	1	Methylethylketone	1	Triethanolamin	1
Dimethylformamide	1	Methylglycol acetate	1	Trikresyl phosphate	1
Dimethylsulfoxide	1	Methylisobutylketone	1	Xylene	3
Dioxane	1	Mineral oils	1		

For the solvents effecting slight changes the user should test the compatibility under the specific application conditions. All tests have been performed at RT. Please be aware that ThinCert™ cell culture inserts are made of PET membranes sealed on polystyrene housings. Therefore, solvents shown compatible with PET membranes in the above table might be incompatible with the polystyrene housing. Please check solvent compatibility with polystyrene on page 226-227.

Resistance scale from 1 to 4

1 = resistant i.e. the plastics may be treated with the chemical compound at mentioned temperature over several years without any significant alterations in its physical, optical and chemical properties

2 = limited resistant i.e. the plastics may be treated with the chemical compound at mentioned temperature over several weeks without any significant alterations in its physical, optical and chemical properties

3 = moderate resistant i.e. the plastics may be treated with the chemical compound at mentioned temperature for short time only (several minutes to one hour) without any alterations in physical, optical and chemical properties (mixing and measuring is possible)

4 = no resistance i.e. treating the plastics with the substance named may cause alterations in physical, optical and chemical properties within seconds

Chemical Resistance of Sealers

	EASYseal™ (Cat.-No. 676 001)	VIEWseal™ (Cat.-No. 676 070)	AMPLIseal™ (Cat.-No. 676 040)	SILVERseal™ (Cat.-No. 676 090)
Acetone	4	4	4	3
Acetonitrile	3	3	4	1
Acetic acid 1 %	3	1	4	3
Glacial acetic acid	1	3	4	3
Chloroform	4	4	4	4
DMSO	3	3	3	1
Ethanol	3	1	1	1
Hydrochloric acid 32 %	3	1	3	4
Isopropanol	3	1	1	1
Methanol	3	1	4	1
Phenol	3	3	4	3
Sulphuric acid 0.5 M	1	1	1	1

1 = Stable no visible change in the sealer after one week's incubation
3 = Moderately stable after one week, optical and physical changes in the sealer (clouding tears on removal)
4 = Unstable adhesive and foil are dissolved, wells not leak-tight
This table can only be used as an orientation aid for the suitability of the respective sealers, since their behaviour against chemicals depends on the respective application. Tests under practical conditions are absolutely essential in many cases.

Temperature Stability of Sealers

	Temperature Stability
EASYseal™	-40 °C to + 120 °C
VIEWseal™	-70 °C to + 100 °C
AMPLIseal™	-80 °C to + 110 °C
SILVERseal™	-80 °C to + 110 °C
BREATHseal™	n.a. Evaporation rate 4200 g H_2O/m^2 in 24 h

This table can basically be used as an orientation aid for the temperature stability of the respective sealers, since the behaviour of the product depends on the respective application. Tests under practical conditions are absolutely essential in many cases.

Physical Properties of Various Materials

Material	Sterilisation by				Autoclavability	Thermal Stability [°C]	Transparency	Gas Permeability [cc x mm/m² x 24 h x Bar]			WVTR (at 37 °C, 90 % humidity) [g x mm/m² x 24 h x Bar]
	gamma irradiation	chemicals (formalin, ethanol)	dry heat	gas*				O_2	N_2	CO_2	
Polystyrene	yes	yes	no	yes	no	-20 to +60	clear	4.7	853	17.8	108 – 155
Poly-propylene	yes	yes	no	yes	yes	-196 to +121	translucent	3.7	744	12.4	3.9
HDPE	yes	yes	no	yes	no	-50 to +100	translucent	2.9	651	9	4.6 – 6.2
LDPE	yes	yes	no	yes	no	-50 to +80	translucent	7.8	2.8	41.9	15.5 – 23.3
UV-Star®	yes	-	no	yes	no	-20 to +40	clear	388	-	-	-
PETG	yes	yes	no	yes	no	-40 to +70	clear	46.5	155	1.2	62
PET	yes	some	no	yes	no	-60 to +150	clear	-	10.9	236	15 – 20
Cycloolefin	yes	-	no	yes	no	-80 to +100	clear		-	-	-

Exemptions are mentioned in the respective product data sheets.
* Ethylene oxide, formaldehyde

Material	Refractive Index
Polystyrene	1.59
UV-Star®	1.53
Cycloolefin	1.53
Glass	1.53

These tables are a general guide only. As many factors can affect the resistance of a given product, its suitability for a specific application should be tested.

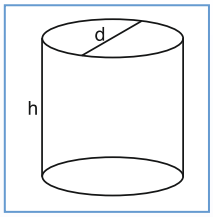
Manual Calculation
– Coefficient of Variation (CV)

The coefficient of variation compares the variability of several random samples with different means, taking into account the different dimensions of means:

$$CV\,\% = \frac{S}{I\,\overline{X}\,I} \cdot 100\,\%$$

where S is the standard deviation and
$I\,\overline{X}\,I$ is the absolute value of the arithmetic mean.

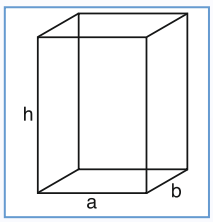
– Volume of Diverse Bodies



Volume of a cylinder:

$$= \frac{\pi \cdot d^2 \cdot h}{4} \qquad = \frac{4 \cdot V}{\pi}$$

This formula can be used for calculating the filling level in relation to the filling volume in a 96 well microplate with cylindrical wells.



Volume of a cuboid:

$$V = a \cdot b \cdot h \qquad = \frac{V}{a \cdot b}$$

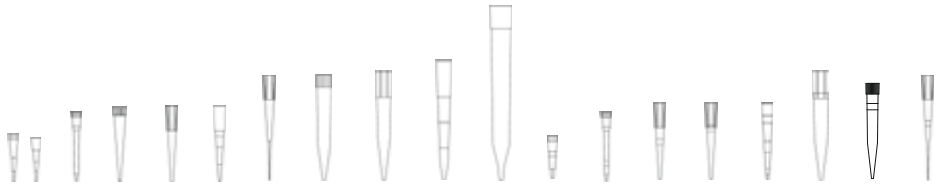
This formula can be used for calculating the filling level in relation to the filling volume in 384 and 1536 well microplates with rectangular wells.

Overview
– Metric prefixes

G	=	giga	=	10^{9}
M	=	mega	=	10^{6}
k	=	kilo	=	10^{3}
c	=	centi	=	10^{-2}
m	=	milli	=	10^{-3}
µ	=	micro	=	10^{-6}
n	=	nano	=	10^{-9}
p	=	pico	=	10^{-12}
f	=	femto	=	10^{-15}
a	=	atto	=	10^{-18}
z	=	zepto	=	10^{-21}

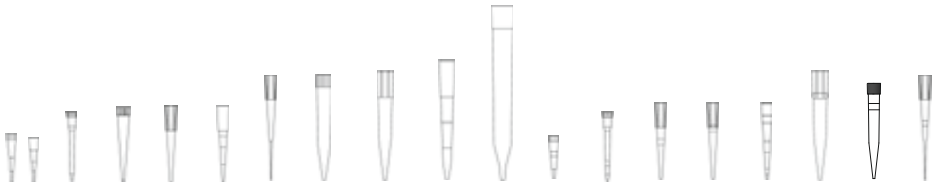
Laboratory Information for Liquid Handling

Table of Compatibility for Pipette Tips and Pipettors



Volume [µl]	0.5 – 10	0.5 – 10	10 – 100	10 – 200	10 – 200	10 – 200	100 – 1000	200 – 1000	200 – 1000	1 – 5 ml	10	10	20	100	200	1000	1000	Gel 20
Description	**771 290** natural **771 291** natural	**765 290** natural	**685 290** yellow	**739 290** yellow	**739 291** natural	**770 290** natural Gel	**686 290** blue **686 295** natural	**740 290** blue	**740 291** natural **740 296** blue	**745 290** natural	**771 288** natural	**765 288** natural	**774 288** natural	**772 288** natural	**739 288** natural	**740 288** natural	**750 288** natural	**775 288** natural
Single-channel Pipettors	**Standard Pipette Tips**										**Filter Pipette Tips (sterile)**							
Biohit® Proline (0.5 – 10 µl)	•	•									•	•						
Biohit® eLine (5 – 120 µl)				•	•	•							•	•				•
Biohit® eLine (50 – 1000 µl)							•	•	•								•	
Brand® Transferpette (2 – 20 µl)		•										•						
Brand® Transferpette (20 – 200 µl)			•	•	•	•							•	•	•			•
Brand® Transferpette (100 – 1000 µl)							•	•	•									
Eppendorf® Reference (0.5 – 10 µl)	•	•									•	•						
Eppendorf® Reference (2 – 20 µl)			•	•	•	•							•	•				•
Eppendorf® Reference (50 µl)			•	•	•	•								•				
Eppendorf® Reference (10 – 100 µl)			•	•	•	•							•	•				•
Eppendorf® Reference (100 µl)			•	•	•	•								•				
Eppendorf® Reference (50 – 200 µl)			•	•	•	•							•	•	•			•
Eppendorf® Reference (500 µl)							•	•	•								•	
Eppendorf® Reference (100 – 1000 µl)							•	•	•								•	
Eppendorf® Reference (1000 µl)							•	•	•								•	
Eppendorf® Research (20 – 200 µl)			•	•	•	•							•	•	•			•
Eppendorf® Research (100 – 1000 µl)							•	•	•								•	
Eppendorf® Research pro (0.5 – 10 µl)	•	•									•	•						
Eppendorf® Research pro (5 – 100 µl)			•	•	•	•							•	•				•
Eppendorf® Research pro (20 – 300 µl)			•	•	•	•							•	•	•			•
Eppendorf® Research pro (50 – 1000 µl)							•	•	•								•	
Finnpipette® Digital 4500 (200 – 1000 µl)							•	•	•							•	•	
Gilson® Pipetman P2 (0.5 – 2 µl)	•	•									•	•						
Gilson® Pipetman P10 (1 – 10 µl)	•	•									•	•						
Gilson® Pipetman P20 (2 – 20 µl)			•	•	•	•							•					•
Gilson® Pipetman P100 (20 – 100 µl)			•	•	•	•							•	•				•
Gilson® Pipetman P200 (50 – 200 µl)			•	•	•	•								•	•			
Gilson® Pipetman P1000 (200 – 1000 µl)							•	•	•							•	•	
Gilson® Pipetman P5000 (1 – 5 ml)										•								
Gilson® F5/F10/F20 (5/10/20 µl)			•	•	•	•							•					•
Gilson® F25/F50 (25/50 µl)			•	•	•	•								•				
Gilson® F100 (100 µl)			•		•													
Gilson® F200 (200 µl)			•	•	•	•									•			
Gilson® F250/F300 (250/300 µl)							•	•	•							•	•	
Gilson® F500/F1000 (500/1000 µl)							•	•	•							•	•	
Gilson® Pipetman U10 (1 – 10 µl)	•	•									•	•						
Gilson® Pipetman U200 (20 – 200 µl)			•	•	•	•							•	•	•			•
Gilson® Pipetman U1000 (200 – 1000 µl)							•	•	•							•	•	

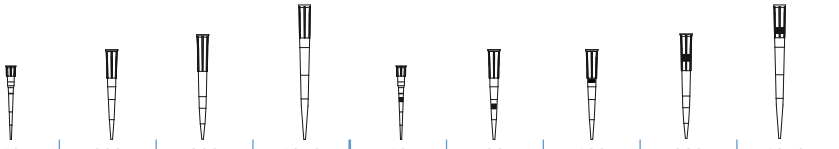
Table of Compatibility for Pipette Tips and Pipettors



Volume [µl]	0.5 – 10	0.5 – 10	10–100	10 – 200	10–200	10–200	100 – 1000	200 – 1000	200 – 1000	1 – 5 ml	10	10	20	100	200	1000	1000	Gel 20
Description	**771 290** natural **771 291** natural	**765 290** natural	**685 290** yellow	**739 290** yellow	**739 291** natural	**770 290** natural Gel	**686 290** blue **686 295** natural	**740 290** blue	**740 291** natural **740 296** blue	**745 290** natural	**771 288** natural	**765 288** natural	**774 288** natural	**772 288** natural	**739 288** natural	**740 288** natural	**750 288** natural	**775 288** natural
Single-channel Pipettors	**Standard Pipette Tips**										**Filter Pipette Tips (sterile)**							
Socorex® Calibra 822 (1 – 10 µl)		•																
Socorex® Calibra 822 (2 – 20 µl)			•	•	•	•							•					•
Socorex® Calibra 822 (10 – 100 µl)			•	•	•	•							•					•
Socorex® Calibra 822 (20 – 200 µl)			•	•	•	•							•	•				•
Socorex® Calibra 822 (100 – 1000 µl)								•	•								•	
Socorex® Acura 825 (0.5 – 10 µl)	•	•									•	•						
Socorex® Acura 825 (2 – 20 µl)			•	•	•	•												
Socorex® Acura 825 (5 – 50 µl)			•	•	•	•							•	•				•
Socorex® Acura 825 (10 – 100 µl)			•	•	•	•							•	•				•
Socorex® Acura 825 (20 – 200 µl)			•	•	•	•							•	•	•			•
Socorex® Acura 825 (100 – 1000 µl)							•	•	•								•	
Multi-channel Pipettors	**Standard Pipette Tips**										**Filter Pipette Tips (sterile)**							
8F Biohit® Proline (50 – 300 µl)			•	•	•									•	•			
8F Biohit® Proline (25 – 250 µl)			•	•	•									•	•			
8F Brand® Transferpette (20 – 200 µl)			•	•	•								•	•	•			
8F Eppendorf® Research (10 – 200 µl)			•	•	•								•	•				
8F Finnpipette® Digital 4510 (50 – 300 µl)			•	•	•									•	•			
8F Gilson® Pipetman (20 – 200 µl)			•	•	•								•	•	•			
8F Socorex® Calibra 852 (1 – 10 µl)	•	•									•	•						
8F Socorex® Acura (5 – 50 µl)			•	•	•								•	•				
8F Socorex® Calibra 852 (20 – 200 µl)			•	•	•								•	•				
12F Eppendorf® Research (0.5 – 10 µl)		•										•						
12F Socorex® Calibra 852 (10 – 100 µl)			•	•	•								•					

The registered trademarks of the mentioned manufacturers belong to the above mentioned companies.

Table of Compatibility for Sapphire Pipette Tips and Pipettors



Volume [µl]	10	200	300	1250	10	20	100	300	1250
Cat.-No.	771 25X	737 25X	738 25X	750 25X	771 26X	773 26X	737 26X	738 26X	750 26X
Pipettors	**Standard Pipette Tips**				**Filter Pipette Tips (sterile)**				
Biohit® M20 (2 – 20 µl)		•	•			•	•	•	
Biohit® M200 (20 – 200 µl)		•	•			•	•	•	
Biohit® Proline (0.5 – 10 µl)	•				•				
Biohit® Proline (200 – 1000 µl)				•					•
Biohit® Proline M3 (0.1 – 3 µl)	•				•				
Biohit® Proline Plus (20 – 200 µl)		•	•			•	•	•	
Biohit® Proline Plus (200 µl)		•	•			•	•	•	
Brand® Transferpette S (0.5 – 10 µl)	•				•				
Brand® Transferpette S (2 – 20 µl)		•				•	•		
Brand® Transferpette S (10 – 100 µl)		•				•	•		
Brand® Transferpette S (20 – 200 µl)		•	•			•	•	•	
Brand® Transferpette S (100 – 1000 µl)				•					•
Capp® (0.5 – 10 µl)	•				•				
Capp® (5 – 50 µl)		•	•			•	•	•	
Capp® (10 – 100 µl)		•	•			•	•	•	
Capp® (10 – 100 µl) handle eject			•					•	
CLP Beta-Pette (0.1 – 2 µl)	•				•				
CLP Beta-Pette (0.5 – 10 µl)	•				•				
CLP Beta-Pette (2 – 20 µl)		•				•	•		
CLP Beta-Pette (10 – 100 µl)		•				•	•		
CLP Beta-Pette (20 – 200 µl)		•	•			•	•	•	
CLP Beta-Pette (100 – 1000 µl)				•					•
CLP Poseidon (0.2 – 2 µl)	•				•				
CLP Poseidon (0.5 – 10 µl)	•				•				
CLP Poseidon (5 – 50 µl)		•	•			•	•	•	
CLP Poseidon (10 – 100 µl)		•	•			•	•	•	
CLP Poseidon (20 – 200 µl)		•	•			•	•	•	
CLP Poseidon (20 – 200 µl) handle eject			•					•	
CLP Poseidon (100 – 1000 µl)				•					•
CLP Poseidon Electronic (2 – 20 µl)	•				•				
CLP Poseidon Electronic (10 – 200 µl)		•	•			•	•	•	
CLP Poseidon Electronic (100 – 1000 µl)				•					•
Eppendorf® Reference (0.1 – 2.5 µl)	•				•				
Eppendorf® Reference (0.5 – 10 µl)	•				•				
Eppendorf® Reference (2 – 20 µl)		•				•	•		
Eppendorf® Reference (10 – 100 µl)		•				•	•		
Eppendorf® Reference (50 – 200 µl)		•	•			•	•	•	
Eppendorf® Reference (100 – 1000 µl)				•					•
Eppendorf® Reference plus (0.1 – 2.5 µl)									
Eppendorf® Research (0.1 – 2.5 µl)	•				•				
Eppendorf® Research (0.5 – 10 µl)	•				•				
Eppendorf® Research (2 – 20 µl)		•				•	•		
Eppendorf® Research (10 – 100 µl)		•				•	•		
Eppendorf® Research (20 – 200 µl)		•	•			•	•	•	
Eppendorf® Research (100 µl)		•				•	•		
Eppendorf® Research (100 – 1000 µl)				•					•
Eppendorf® Research plus (0.1 – 2.5 µl)	•				•				
Eppendorf® Research plus (0.5 – 10 µl)	•				•				
Eppendorf® Research plus (2 – 20 µl)	•	•			•	•	•		
Eppendorf® Research plus (10 – 100 µl)		•				•	•		
Eppendorf® Research plus (100 – 1000 µl)				•					•

Table of Compatibility for Sapphire Pipette Tips and Pipettors

Volume [µl]	10	200	300	1250	10	20	100	300	1250
Cat.-No.	771 25X	737 25X	738 25X	750 25X	771 26X	773 26X	737 26X	738 26X	750 26X
Pipettors	**Standard Pipette Tips**				**Filter Pipette Tips (sterile)**				
Finnpipette (0.5 – 10 µl)	•				•				
Finnpipette (2 – 20 µl)		•				•	•		
Finnpipette (5 – 50 µl)	•	•	•		•	•	•	•	
Finnpipette (20 – 200 µl)		•	•			•	•	•	
Finnpipette (30 – 300 µl)		•	•			•	•	•	
Finnpipette (100 – 1000 µl)				•					•
Finnpipette (200 – 1000 µl)				•					•
Finnpipette F1 (1 – 10 µl)	•				•				
Finnpipette F1 (10 – 100 µl)		•	•			•	•	•	
Finnpipette F2 (10 – 100 µl)		•	•			•	•	•	
Gilson Pipetman P2	•				•				
Gilson Pipetman P10	•				•				
Gilson Pipetman P20		•				•			
Gilson Pipetman P100		•				•	•		
Gilson Pipetman P200		•	•			•	•	•	
Gilson Pipetman P1000				•					•
Gilson Pipetman Ultra U20 (2 – 20 µl)		•				•	•		
Gilson Pipetman Ultra U200 (20 – 200 µl)		•	•			•	•	•	
Hamilton (0.2 – 2 µl)	•				•				
Hamilton (1 – 10 µl)	•				•				
Hamilton (2.5 – 25 µl)		•	•			•	•	•	
Hamilton (10 – 100 µl)		•	•			•	•	•	
Hamilton (30 – 300 µl)		•	•			•	•	•	
Hamilton (100 – 1000 µl)				•					•
Nichiryo Nichipet EX (0.5 – 10 µl)	•				•				
Nichiryo Nichipet EX (2 – 20 µl)		•				•	•		
Nichiryo Nichipet EX (10 – 100 µl)		•				•	•		
Nichiryo Nichipet EX (20 – 200 µl)		•	•			•	•	•	
Nichiryo Nichipet EX (100 – 1000 µl)				•					•
Nichiryo Oxford Benchmate II (0.1 – 2 µl)	•				•				
Nichiryo Oxford Benchmate II (2 – 20 µl)		•				•	•		
Socorex® Calibra 822 (1 – 10 µl)	•				•				
Socorex® Calibra 822 (10 – 100 µl)		•				•	•		
Socorex® Calibra 822 (20 – 200 µl)		•	•			•	•	•	
Socorex® Calibra 822 (100 – 1000 µl)				•					•
VWR® Ergonomic High-Performance (2 – 20 µl)		•	•			•	•	•	
VWR® Ergonomic High-Performance (20 – 200 µl)		•	•			•	•	•	
VWR® Ergonomic High-Performance (50 – 250 µl)		•	•			•	•	•	
VWR® Ergonomic High-Performance (100 – 1000 µl)				•					•
VWR® Ultra High-Performance (0.1 – 2 µl)	•				•				
VWR® Ultra High-Performance (0.5 – 10 µl)	•				•				
VWR® Ultra High-Performance (2 – 20 µl)		•	•			•	•	•	
VWR® Ultra High-Performance (10 – 100 µl)		•	•			•	•	•	
VWR® Ultra High-Performance (20 – 200 µl)		•	•			•	•	•	
VWR® Ultra High-Performance (100 – 1000 µl)				•					•

Table of Compatibility for PCR Microplates

Cat.-No.	652 201	652 250	652 260	652 270	652 280	652 290	669 285	785 201	785 285	785 290
Amersham Biosciences / GE										
MegaBACE 500				•						
MegaBACE 1000				•						
MegaBACE 4000								•		•
Agilent										
SureCycler 8800	•			•				•		
Applied Biosystems										
ABI PRISM® 2700	•	•	•			•				•
ABI PRISM® 2720	•	•	•			•				•
ABI PRISM® 310		•	•			•				
ABI PRISM® 3100	•	•	•			•				•
ABI PRISM® 3130	•	•	•			•				•
ABI PRISM® 3700	•	•	•		•	•		•		•
ABI PRISM® 3730/3730x	•	•	•			•		•		•
ABI PRISM® 7000	•	•	•			•		•		
ABI PRISM® 7300		•	•			•				
ABI PRISM® 7500		•	•			•				
ABI PRISM® 7700	•	•	•		•	•				
ABI PRISM® 7900 HAT			•		•	•				•
GeneAmp® PCR System 2700			•							
GeneAmp® PCR System 7500			•							
GeneAmp® PCR System 9600	•	•	•		•	•				
GeneAmp® PCR System 9700	•	•	•			•		•		•
3500			•							•
5700			•							
6100			•							
ProFlex™ PCR System	•									
QuantStudio™ 12K Flex	•		•							•
Veriti®	•		•					•		•
ViiA™ 7	•		•							•
Analytik Jena / Biometra										
FlexCycler	•							•		
qTOWER	•									
SpeedCycler	•									
T1 Thermal Cycler	•	•		•		•		•		•
T3000		•		•						•
TGradient	•	•	•	•		•				
TPersonal	•									
TOptical	•	•		•						•
TProfessional	•	•		•				•		•
TRobot	•	•		•		•		•		•
UNO	•	•		•		•				
UNO II	•	•		•		•		•		•
Axygen										
MaxyGene™ II	•			•						
Bio-Rad /MJ Research										
BaseStation				•						
C1000/S1000	•	•		•				•		•
CFX 384								•		•
CFX 96	•			•						
CFX Connect	•			•						
Chromo 4	•			•						
DNA Engine family	•	•		•				•		•
Dyad Disciple	•	•		•		•				•
Gene Cycler		•	•							
iCycler	•	•	•	•	•	•				•
iQ5	•			•		•				
iQ™ 5	•	•		•						
Mini Gradient		•								
MiniOpticon™										
MyCycler	•	•		•		•				
MyIQ	•			•						
Opticon		•		•						
Opticon 2		•		•						
Personal		•								
PTC-100	•	•		•	•	•				•
PTC-200	•	•	•	•	•	•				•
PTC-225 Tetrad	•	•	•	•	•	•				•
T100	•	•		•						

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Technical appendix is subject to error and technical modifications.

Cat.-No.	652 201	652 250	652 260	652 270	652 280	652 290	669 285	785 201	785 285	785 290
Corbett Research										
Palm-Cycler™ 96				•		•				
Palm-Cycler™ 384								•		•
Eppendorf										
Mastercycler Nexus	•			•						
Mastercycler Nexus Eco	•			•						
Mastercycler Nexus Gradient	•			•						
Mastercycler Pro	•			•				•		•
Mastercycler Pro 384										
Mastercycler®	•	•		•		•				
Mastercycler® ep	•			•		•				
Mastercycler® ep realplex	•			•						•
Mastercycler® Gradient		•	•	•		•				
Mastercycler® M384								•		•
Ericom										
Deltacycler I	•	•			•	•				
Deltacycler II		•								
Power Block I		•								
SingleBlock	•	•			•	•				
TwinBlock	•	•			•	•				
Esco										
Gene	•	•		•						•
Genius	•	•		•						
Swift	•	•								•
Flexi										
Gene	•			•		•				•
Genius	•			•		•				
G-Storm										
GS1	•	•	•			•				
GS2	•	•	•			•				
GS4	•	•	•			•				
GSX	•	•	•			•				
GSXs	•	•	•			•				
MWG										
Primus 96	•	•		•	•	•				
Primus 384								•		•
Roche										
LightCycler® 96							•			
LightCycler® 384									•	•
Stratagene										
Gradient Temp. Cycler		•	•							
Mx3000P/4000	•	•								
Mx4000 and Mx3005P	•	•	•			•				
RoboCycler				•	•					
RoboCycler 96	•	•								
RoboCycler Gradient	•	•	•			•				
TaKaRa										
TP 240				•						
TP 3000	•	•	•	•	•	•				
Techne										
Cyclogene	•	•	•			•				
Flexigene	•	•	•	•		•				•
Genius	•	•	•	•	•	•		•		
Genius (TC412)	•	•	•	•		•				
Genius Quad	•	•	•			•				
Quantica				•						
Touchgene	•	•				•				
Touchgene Gradient	•	•	•	•	•	•		•		•
Touchgene X		•		•		•		•		•
Thermo Hybaid										
Multiblock System	•	•	•	•	•	•		•		•
OMN-E	•	•	•	•	•	•				•
Omnigene	•	•	•	•	•	•		•		•
PCR Express	•	•	•	•	•	•		•		•
PCR Sprint	•	•	•	•		•				
PxE / Px2	•	•	•	•		•		•		•
Touchdown	•	•	•	•	•	•		•		•
Transgenomic										
WAVE®				•						

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Laboratory Information for Centrifugation

Centrifugation – Principle and Calculation of the RCF (Relative Centrifugal Force)

Sedimentation of particles in a gravitational field

If a mixture of sand and water is shaken thoroughly and then left to stand, the sedimentation of the solid particles takes place according to their size. As a result of gravitational acceleration (g = 9.81 m/s²), all of the particles are located in a gravitational field under the influence of which the coarse grains of sand collect at the bottom first and the smaller grains of sand are deposited later. After around 10 – 20 minutes, the following layering is produced (from bottom to top):
coarse grains of sand – fine grains of sand – water.

However, other particles (proteins, nucleic acids, viruses, pro- or eucaryotic cells) do not necessarily precipitate or only sediment out after they have been exposed to higher forces than the force of gravity resulting from the gravitational acceleration. If these forces exceed the counter-forces resulting from convection (heat circulation) and Brownian molecular motion, both of which cause constant mixing of solutions and suspensions, sedimentation takes place.

The sedimentation rate can be calculated on the basis of Stoke's law as follows:

$$v = \frac{d^2\,(\rho_P - \rho_L)\,g}{18\mu}$$

where v = sedimentation rate, ρ_P = density of the particle, ρ_L = density of the liquid, g = 9.81 m/s², μ = viscosity of the liquid

However, a particle will only sediment out if $\rho_P > \rho_L$. If $\rho_P < \rho_L$, v becomes negative, consequently the particle floats rather than sedimenting out.

Influence of the Centrifugation and Calculation of the RCF respectively RPM

A centrifuge can be used to create a transient gravitational field under the influence of which the sedimentation of cells, cellular components and macro-molecules takes place. In a centrifuge, a suspension located in a centrifuge tube rotates around a rotational axis. Each particle of the suspension is subject to centrifugal force, which moves it radially away from the rotational axis. The centrifugal force F_C is calculated as follows:

$$F_C = m_P \omega^2 r$$

where m_P = mass of the particle, ω = angular velocity (s^{-1}) and r = distance of the particle from the rotational axis

The force acting on a particle in a centrifugal field is stated relative to gravitational acceleration, usually as so-called *relative centrifugal force* (RCF) or *g-force* (x g). It is calculated as follows:

$$RCF = 11.18 r \left(\frac{R}{1000}\right)^2$$

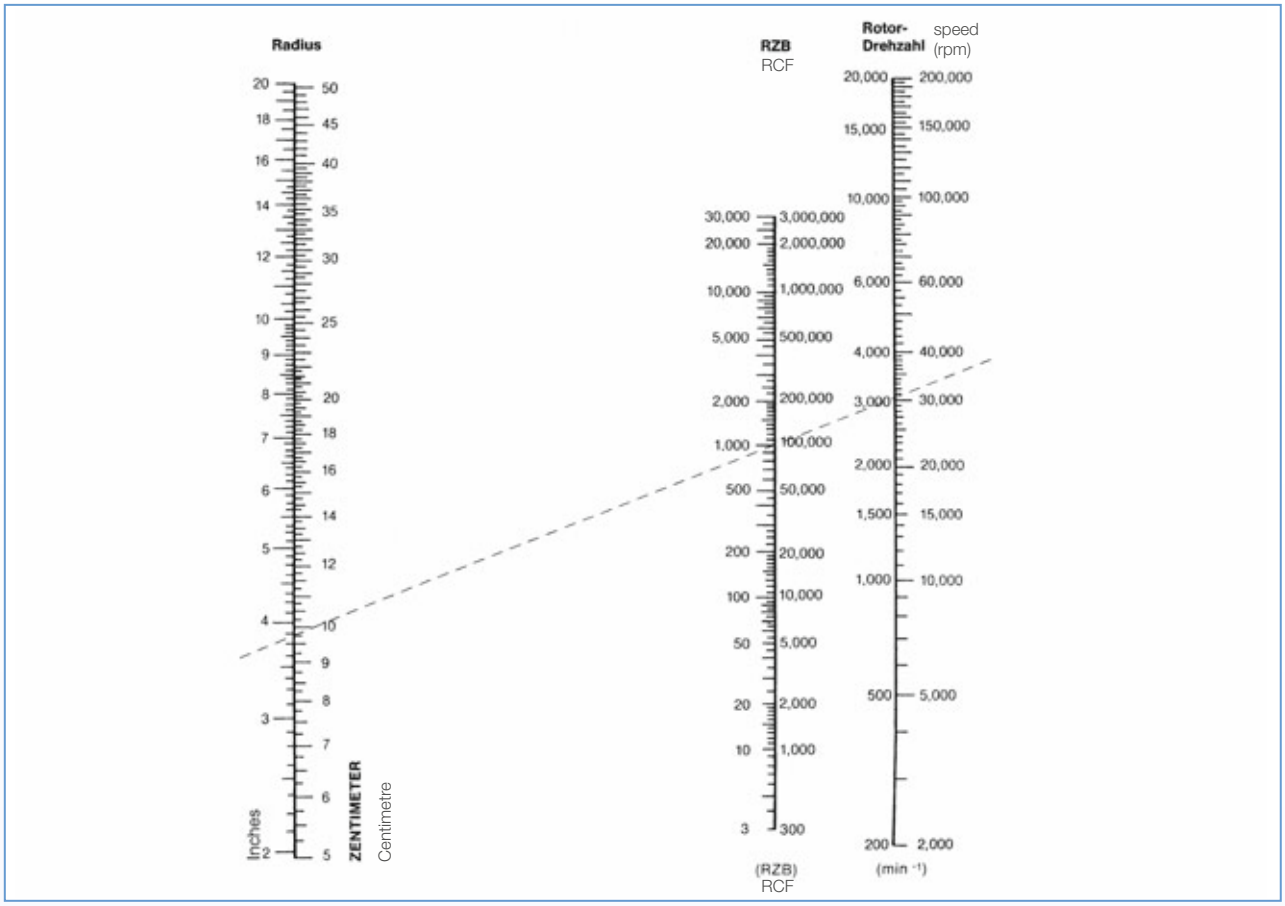
where R = rotor revolutions per min and r = distance of the particle from the rotational axis (cm)

For easier conversion of the RCF or *g-force* into revolutions per min, the equation can be transformed as follows:

$$R = 299 \sqrt{\frac{RCF}{r}}$$

Technical appendix is subject to error and technical modifications.

Alignment Chart



By use of a ruler, the third value relating to two known scale values can be read from the alignment chart.

Maximal Centrifuge Capacity of Tubes, Reaction Tubes and Microplates

The maximum centrifuge capacity for Greiner Bio-One tubes, reaction tubes and microplates is listed in the form of the RCF in the tables below.

Measuring method:
For centrifugation, all products were filled with water up to their maximum filling volume.

Determination of the maximum RCF in a swinging-bucket rotor was conducted in a Thermo Scientific Centrifuge (Heraeus Multifuge BSR Plus). Determination of the maximum RCF in a fixed-angle rotor was conducted in a Sorvall Centrifuge (Evolution RC). Therefore special rotor inserts for different vessel shapes and sizes were used for a stable fit.

Reaction Tubes

Cat.-No.	Volume [ml]	max. RCF [g] fixed-angle rotor
616 2XX	1.5	18000
623 2XX	2.0	16000
667 2XX	0.5	51400
693 2XX	0.5	18000
716 2XX	1.5	20000
717 2XX	1.5	20000
722 2XX	2.0	22000
742 2XX	0.7	28000

Polystyrene Tubes

Cat.-No.	Dimensions ø [mm] x height [mm]	max. RCF [g] swinging-bucket rotor	max. RCF [g] fixed-angle rotor
103 1XX	10.5 x 40	5800	-[1]
106 1XX	11 x 63	5800	6200
109 1XX	11 x 70	5200	-[1]
112 1XX	12 x 55	5800	6200
115 1XX	12 x 75	5800	5800
116 1XX	12 x 75	5800	-[1]
120 1XX	12.4 x 75	4800	5000
125 1XX	13 x 100	4000	7500
136 1XX	14 x 100	4000	5200
160 1XX	16 x 100	5800	6200
163 1XX	17 x 100	3000	5000
164 1XX	16.8 x 100	5000	5000
166 1XX	16 x 110	2500	3200
172 1XX	16.5 x 103	4800	4800
186 1XX	17 x 120	2500	2800
187 1XX	17 x 100	5200	6600
188 1XX	17 x 120	2500	4500
191 1XX	18 x 95	4000	5500
201 1XX	24 x 90	1000	3500

[1] No fitting rotor inserts available.

Polypropylene Tubes

Cat.-No.	Dimensions ø [mm] x height [mm]	max. RCF [g] swinging-bucket rotor	max. RCF [g] fixed-angle rotor
102 2XX	8.5 x 44	5800	20000
112 2XX	12 x 55	5800	30000
115 2XX	12 x 75	5800	34000
121 2XX	12.5 x 48	5800	34000
122 2XX	12.5 x 48	5800	34000
123 2XX	12.5 x 42	5800	26000
124 2XX	12.5 x 86	5800	34000
126 2XX	12.4 x 47	5800	26000
127 2XX	12.4 x 83	5800	34000
160 2XX	16 x 100	5800	34000
160 297	16 x 100	3500	34000
163 2XX	16 x 100	5000	26000
184 261	17 x 77	4800	34000
187 201	17 x 100	4800	34000
187 261	18 x 95	4800	34000
188 2XX	17 x 120	4000	15000
191 2XX	18 x 95	4800	34000
210 2XX	30 x 115	2800	11500
227 2XX	30 x 115	3200	9500
227 261*)	30 x 115	3200	17000
227 270*)	30 x 115	3200	17000
227 281 / 227 285	30 x 115	3200	9500
227 280 / 227 283	30 x 115	3200	9000

*) The stated maximum RCF values are guidelines only, depending on a variety of factors such as rotor, temperature, density, pH and type of liquid. The suitability of tubes for a specific application using high centrifugation forces has to be tested.

Polyethylene Tubes

Cat.-No.	Dimensions ø [mm] x height [mm]	max. RCF [g] swinging-bucket rotor	max. RCF [g] fixed-angle rotor
112 3XX	12 x 55	4200	22000
115 3XX	12 x 75	4200	20000
160 3XX	16 x 100	3500	30000
187 3XX	17 x 100	5800	20000

Technical appendix is subject to error and technical modifications.

Multiwell Plates

Cat.-No.	Multiwell Plate	max. RCF [g] swinging-bucket rotor
657 160	6 well, PS, clear	4800
665 102	12 well, PS, clear	4800
662 160	24 well, PS, clear	4800
677 180	48 well, PS, clear	4800

Microplates

Cat.-No.	Microplate	max. RCF [g] swinging-bucket rotor
650 101	96 well, PS, U-bottom, clear	1000
651 101	96 well, PS, V-bottom, clear	4800
655 101	96 well, PS, F-bottom, clear	4800
650 201	96 well, PP, U-bottom, natural	4800
651 201	96 well, PP, V-bottom, natural	4800
655 201	96 well, PP, F-bottom, natural	4800
655 209	96 well, PP, U-bottom, black	4800
655 074	96 well, PS, F-bottom, white	4800
655 076	96 well, PS, F-bottom, black	4800
655 094	96 well, PS, µClear®, white	4800
655 096	96 well, PS, µClear®, black	4800
655 801	96 well, PS, UV-Star®	4800
780 201	96 well, PP, MASTERBLOCK® 1 ml	4800
780 270	96 well, PP, MASTERBLOCK® 2 ml	4800
786 201	96 well, PP, MASTERBLOCK® 0.5 ml	4800
781 101	384 well, PS, clear	4800
781 073	384 well, PS, white	4800
781 077	384 well, PS, black	4800
781 094	384 well, PS, µClear®, white	4000
781 096	384 well, PS, µClear®, black	3000
781 201	384 well, PP, F-bottom, natural	4800
781 280	384 well, PP, V-bottom, natural	4800
781 270	384 well, PP, V-bottom, Deep Well, natural	4800
781 801	384 well, PS, UV-Star®	4800
784 101	384 well, PS, Small Volume™, clear	800
784 075	384 well, PS, Small Volume™, white	800
784 076	384 well, PS, Small Volume™, black	800
784 201	384 well, PP, Small Volume™, natural	4800

Microplates

Cat.-No.	Microplate	max. RCF [g] swinging-bucket rotor
782 101	1536 well, PS, HiBase, clear	1800
782 074	1536 well, PS, HiBase, white	1500
782 077	1536 well, PS, HiBase, black	1500
782 094	1536 well, PS, µClear®, HiBase, white	1000
782 096	1536 well, PS, µClear®, HiBase, black	1500
782 270	1536 well, PP, V-bottom, Deep Well, natural	4800
783 101	1536 well, PS, LoBase, clear	4800
783 075	1536 well, PS, LoBase, white	4800
783 076	1536 well, PS, LoBase, black	4800
783 094	1536 well, PS, µClear®, LoBase, white	4800
783 096	1536 well, PS, µClear®, LoBase, black	4800

PCR Plates

Cat.-No.	PCR Plate	max. RCF [g] swinging-bucket rotor
652 270	96 well, PP, natural, full-skirt	4800
652 280	96 well, PP, natural, half-skirt	4800
652 290	96 well, PP, natural, half-skirt, suitable for ABI	4800
785 201	384 well, PP, natural, full-skirt	4800
785 290	384 well, PP, natural, full-skirt, suitable for ABI	4800

For centrifugation the plates were filled with water as follows:

96 well	300 µl
384 well	50 µl
1536 well	5 µl

Laboratory Information for Sample Storage

Freezing protocol

1. Wash the cells with warm PBS solution, aspirate the solution and cover the cells with a solution containing trypsin and EDTA (a thin liquid film is enough; the concentration should be evaluated for each cell line).
2. Incubate the cells for max. 3 – 5 min at 37 °C.
3. Once the cells detach from the bottom, stop incubation by adding cell culture medium supplemented with serum and slightly suspend cells using a pipette.
4. Spin down the suspension (500 x g, 5 min) and resuspend the pellet with medium containing serum.
5. Determine the cell number (using a Neubauer chamber).
6. Spin down the cells for 5 min at 500 x g and discard the supernatant. Resuspend the pellet with an adequate volume of cell culture medium containing serum.
7. Mix the cell suspension 1:1 with freezing medium (60 % medium, 20 % FCS, 20 % DMSO) and transfer it in Cryo.s™. For freezing in Cryo.s™ the concentration of cells should be 1 – 5 x 10^6 cells/ml.
8. Cryo.s™ containing cells should be frozen at a cooling rate of -1 K/min. This can be achieved by placing them into an isopropanol-filled chamber at -70 °C. If other types of samples are contained, Cryo.s™ may be frozen directly at -20 °C, -70 °C or in the gas phase of liquid nitrogen. In order to assure even freezing of the sample, 4 and 5 ml Cryo.s™ should be frozen at -20 °C overnight before transferring them to -70 °C or to the gas phase of liquid nitrogen.
9. Then transfer the Cryo.s™ into the nitrogen tank. To avoid contamination (e.g. mycoplasma) and due to safety precautions it is recommended to store the Cryo.s™ in the **gas phase** above and not in the liquid nitrogen.

Thawing protocol

1. Immediately after removing them out of the nitrogen tank the frozen cells are thawed in about 1 – 2 min brandishing the Cryo.s™ in a water bath at 37 °C. The thawing process should be performed as fast as possible.
2. Transfer the thawed cell suspension into a 15 ml tube and mix it immediately with copious amounts of cell culture medium containing serum.
3. After spinning down the cells (500 x g, 5 min) discard the supernatant and resuspend the pellet in an appropriate cell culture medium supplemented with serum and transfer it into one or more cell culture flasks.
4. Follow the recommended cell concentration for seeding.
5. During the next 12 hours cells should rest.
6. A change of medium is recommended after 24 resp. 48 hours.

Safety advisory for working with Cryo.s™

Cryo.s™ tubes are intended for sample storage exclusively in the gas phase over liquid nitrogen or in freezers! If Cryo.s™ are stored in the liquid phase, nitrogen can seep into the tubes. Then upon thawing the vaporising nitrogen can generate high pressure, ultimately resulting in an explosion, as well as the release of any infectious material.
Always take appropriate personal safety measures when working with Cryo.s™, including wearing safety clothing, using goggles and working at a safety laboratory bench.
When undertaking cryogenic preservation, Cryo.s™ must be evenly exposed to freezing temperatures. Uneven temperature exposures can cause formation of ice plugs (i.e. at tube top) that inhibit the expansion of freezing liquid (i.e. at tube bottom), resulting in dangerous high pressure and subsequent harm or damage of tubes.

Never exceed maximum working volumes as specified in → chapter 11.

Laboratory Information for Immunology

Volume-Dependent Wetting of Immunological Products

Liquid volume [µl]	Covered area [mm²]	Liquid height [mm]	Area / volume ratio [cm²/cm³]
96 Well ELISA Microplate, U-Bottom			
25	34	1.7	13.6
50	52	2.6	10.4
75	68	3.4	9.1
100	84.6	4.2	8.5
125	99	4.9	7.9
150	115.5	5.7	7.7
175	130	6.4	7.4
200	145	7.1	7.3
225	160	7.8	7.1
250	174.7	8.5	7.0
275	190	9.2	6.9
300	205	9.9	6.8
96 Well ELISA Microplate, V-Bottom			
25	35	2.3	14.0
50	54.6	3.4	10.9
75	72.4	4.4	9.7
100	88.6	5.3	8.9
125	105	6.2	8.4
150	123.8	7.2	8.3
175	140.8	8.1	8.0
200	156	8.9	7.8
96 Well ELISA Microplate, F-Bottom/Standard			
25	47	0.8	18.8
50	62	1.55	12.4
75	77.5	2.3	10.3
100	92	3.0	9.2
125	108	3.8	8.6
150	123	4.5	8.2
175	137.6	5.2	7.9
200	152.3	5.9	7.6
225	168	6.65	7.5
250	183	7.35	7.3
275	197	8.0	7.2
300	212	8.7	7.1
96 Well ELISA Microplate, F-Bottom/Chimney Well			
25	47	0.7	18.8
50	64	1.5	12.8
75	78.5	2.2	10.5
100	93	2.9	9.3
125	108	3.6	8.6
150	122.6	4.3	8.2
175	137.5	5.0	7.9
200	152	5.7	7.6
225	167	6.4	7.4
250	182	7.1	7.3
275	197	7.8	7.2
300	212	8.4	7.1

Liquid volume [µl]	Covered area [mm²]	Liquid height [mm]	Area / volume ratio [cm²/cm³]
96 Well ELISA Microplate, F-Bottom, Half Area			
25	38	1.65	15.2
50	60	3.2	12.0
75	81.5	4.7	10.9
100	103.6	6.2	10.4
125	124.5	7.6	10.0
150	144	8.9	9.6
175	165.8	10.3	9.5
200	181.7	11.5	9.1
C8 Strip Plate			
25	39	1.0	15.6
50	56	1.9	11.2
75	73	2.8	9.7
100	88.6	3.6	8.9
125	104.3	4.4	8.3
150	120	5.2	8.0
175	136.5	6.0	7.8
200	150.8	6.7	7.5
225	165.4	7.4	7.4
250	181	8.15	7.2
275	196	8.85	7.1
300	211	9.55	7.0
F8 Strip Plate			
25	50.4	0.8	20.2
50	64	1.45	12.8
75	79.7	2.2	10.6
100	93.5	2.85	9.4
125	108.3	3.55	8.7
150	123	4.25	8.2
175	138	4.95	7.9
200	153	5.65	7.7
225	167	6.3	7.4
250	182	7.0	7.3
275	196	7.65	7.1
300	211.5	8.35	7.1
U8 Strip Plate			
25	34	1.7	13.6
50	52	2.6	10.4
75	68	3.4	9.1
100	84	4.2	8.4
125	99.6	4.95	8.0
150	115	5.75	7.7
175	129.6	6.45	7.4
200	144	7.15	7.2
225	159	7.85	7.1
250	174	8.55	7.0
275	189	9.25	6.9
300	204	9.95	6.8

Liquid volume [µl]	Covered area [mm²]	Liquid height [mm]	Area / volume ratio [cm²/cm³]
U16 Strip Plate			
25	35	1.75	14.0
50	52	2.6	10.4
75	68	3.4	9.1
100	84	4.2	8.4
125	98.6	4.9	7.9
150	115	5.7	7.7
175	129.6	6.4	7.4
200	144	7.1	7.2
225	159	7.8	7.1
250	174	8.5	7.0
275	189	9.2	6.9
300	204	9.9	6.8

Liquid volume [µl]	Covered area [mm²]	Liquid height [mm]	Area / volume ratio [cm²/cm³]
F16 Strip Plate			
25	49	0.8	19.6
50	63	1.5	12.6
75	79.8	2.3	10.6
100	94.3	3.0	9.4
125	108	3.7	8.6
150	123.5	4.4	8.2
175	138	5.1	7.9
200	153	5.8	7.7
225	168	6.5	7.5
250	183	7.2	7.3
275	198	7.9	7.2
300	213	8.6	7.1
384 Well Microplate, F-Bottom			
25	39.07	2.50	15.6
50	66.60	4.8	13.3
75	94.03	7.00	12.5
100	119.63	9.05	12.0
125	145.6	11.05	11.6
132	152.6	11.50	11.6

Abbreviations

ANSI	American National Standards Institute
COC	Cycloolefin co-polymer
COP	Cycloolefin polymer
CV	Coefficient of Variation
DMSO	Dimethyl Sulphoxide
DNA	Deoxyribonucleic Acid
DNase	Deoxyribonuclease
ECM	Extracellular Matrix
EL-Rack	EasyLoad® Rack
ELISA	Enzyme Linked Immuno Sorbent Assay
EVA	Ethyl Vinyl Acetate
FDA	Food and Drug Administration
FIA	Fluorescence Immuno Assay
F-Rack	Filter Tip Rack
HDPE	High Density Polyethylene
HLA	Human Leucocyte Antigen
HTS	High-Throughput Screening
IgG	Immunoglobulin G
ID-Card	Identity Card
LAL	Limulus Amoebocyte Lysate
LIA	Luminescence Immuno Assay
med.	Medium
NMWCO	Nominal Molecular Weight Cut-Offs
PC	Polycarbonate
PCR	Polymerase Chain Reaction
PDL	Poly-D-Lysine
PET	Polyethylene Terephthalate
PETG	Polyethylene Terephthalate Copolymer
pH	pH Value
PLA	Polylactate
PLL	Poly-L-Lysine
PP	Polypropylene
PS	Polystyrene
PTFE	Polytetrafluoroethylene
RNA	Ribonucleic Acid
RNase	Ribonuclease
rRNA	Ribosomal RNA
RT	Room Temperature
SBS	Society for Biomolecular Sciences
SPA	Scintillation Proximity Assays
ST-Rack	Standard Rack
TC	Tissue Culture
USP	United States Pharmacopoeia
UV Spectrum	Ultraviolet Spectrum
VIS Spectrum	Visible Spectrum

Units	
°C	Degree Centigrade
Da	Dalton, the unit of molecular mass
g	Gram or Gravitational Acceleration (about 9.81 m/s²)
Gy	Gray, Radiation Unit
h	Hour
l	Liter
M	Molarity, moles of solute per litre of solution
m	Meter
min	Minute
Mol	Absolute Amount of Substance
s	Second

Technical appendix is subject to error and technical modifications.

Glossary

Advanced TC™ is a polymer modification increasing the cellular primary and long-term adhesion of Greiner Bio-One cell culture vessels. Based on the innovative technique the surface of the cell culture vessels is modified to positively influence cellular features and functions. Enhanced cellular adhesion and higher proliferation rates improve cell expansion and cultivation of sensitive cells or cells under restricted growth conditions.

Biobanking Tubes are 300 µl, 600 µl and 1000 µl Cryo.s™ tubes for the efficient storage of biological samples in large-scale biorepositories. The design of tubes and racks allows for a very space-efficient storage with up to 30 % better utilisation of storage space in freezers or liquid nitrogen tanks. In addition, they are optimised for sample storage at extremely low temperatures over long periods of time.

Bioburden is used to describe the colonisation of viable microorganisms on a material or product and is the basis for determining the necessary radiation dose for sterilisation.

C-bottom stands for the well profile of a flat well bottom with rounded corners.

CELLCOAT® is the Greiner Bio-One brand name for all protein-coated cell culture vessels for adherent cell culture.

CELLMASTER™ is a quality term that refers to all roller bottles.

CELLreactor™ is a 15 ml / 50 ml polypropylene tube with filter screw cap for the cultivation of suspension and spheroid cells, expansion of aerobic bacteria, yeast or other microorganisms as well as storage of components and liquids requiring gas exchange.

Cell-repellent surface reliably prevents cell attachment in suspension cultures of semi-adherent and adherent cell lines where standard hydrophobic surfaces generally used for suspension culture are insufficient.

CELLSTAR® is a Greiner Bio-One brand name and includes culture vessels with physically modified surfaces for adherent or suspension cell cultures.

CELLview™ is a quality term for cell culture products with glass bottom for high-resolution microscopic applications.

Datamatrix Code is a 2D barcode which can also be used for tracking biological and medical reagents and samples. Its small footprint provides nearly infinite scalability and large data capacity. Datamatrix codes can be scanned independent of their orientation and are very accurate due to the Reed-Solomon error correction method.

Deep Well microplates have conical bottom wells and are ideally suited for the storage of non-human samples.

EASYstrainer™ are cell strainers for the fast and safe filtration of cell suspensions such as those from tissue dissociation or for flow cytometry.

F-bottom stands for a flat bottom well profile.

F-bottom / chimney well stands for the well profile of a flat well bottom in a chimney-like arrangement. In other words, each well stands on its own. The risk of contamination from sample material being carried over is minimised.

FLUOTRAC™ is a quality term for immunological products, referring to black microplates (fluorescence measurement).

FourWell Plate™ is a subdivided plate for microscopic applications facilitating the cultivation of cells and the storage of microscopic slides in an HTS-compatible plate complying with ANSI standards.

Hanging Drop is a technique for protein crystallisation based on → vapour diffusion, where droplets literally hang from the top of an upper substrate.

HiBase is a special plate profile of 384 well → Small Volume™ and 1536 well microplates. In contrast to the → LoBase profile, the HiBase profile is particularly well suited for top-reading systems, since the measuring optic has a minimal separation from the upper edge of the well in this plate profile.

High binding microplates (= MICROLON® 600, FLUOTRAC™ 600 and LUMITRAC™ 600) are immunological microplates with a high-binding polystyrene surface. Hydrophilic groups are introduced to the polystyrene surface by physical treatment. The high binding surface contains more hydrophilic groups than the less hydrophilic → medium binding surface.

LoBase is a special plate profile in 384 well → Small Volume™ and 1536 well microplates. In contrast to the → HiBase profile, the LoBase profile is particularly well suited for bottom-reading sytems, since the measuring optic has a minimal separation from the well bottom in this plate profile.

LUMITRAC™ is a quality term for immunological products, referring to white microplates (luminescence measurement).

MASTERBLOCK® is a brand name that stands for polypropylene microplates that are suitable for the storage of non-human sample material. They are also ideally suited for cultivating bacteria or yeast.

Med. binding (medium binding) microplates (= MICROLON® 200, FLUOTRAC™ 200 and LUMITRAC™ 200) are immunological microplates with a less hydrophobic surface than → high binding microplates.

Microbatch under oil is a method for protein crystallisation where the droplet is covered with oil. The oil generally used is paraffin wax and/or silicone oil. Paraffin wax allows little to no diffusion of water out of the droplet. Hence, all the reagents involved in the crystallisation process, as well as the protein, are present at defined concentrations, and no significant increase of concentration occurs within the crystallisation droplet. When paraffin wax is mixed with silicone oil, it is possible for water to diffuse out of the droplet through the oil and both protein and reagent concentrations increase within the droplet.

µClear® (Micro-Clear) microplates, in contrast to standard microplates with a solid bottom, have a very thin foil bottom. µClear® microplates are ideal for cell-based test systems, microscopic analyses, as well as for bottom-reading systems.

MICROLON® is a quality term for immunological products, referring to clear microplates (transmission measurement).

Non-binding microplates are characterised by low protein, DNA, RNA and peptide binding properties.

OneWell Plate™ is a non-divided HTS plate for tissue culture applications complying with the ANSI standards. The plate is also available in a non-TC-treated version for bacteriology.

Sapphire is a quality term for pipette and filter tips. The product family comprises standard pipette tips, standard filter tips as well as a low-retention version of both. All tips are transparent, graduated and allow precise pipetting with maximal recovery. They can be used with all common pipettors.

SCREENSTAR is a quality term for microplates manufactured out of high-quality cycloolefin with an ultra-clear film bottom for high-content and high-throughput screening.

Sitting Drop is a technique for protein crystallisation based on → vapour diffusion, where droplets sit on the bottom of a substrate.

Small Volume™ is a well profile that was developed in 384 well format for reducing the sample volume. The → LoBase and → HiBase variants are distinguished here. In contrast to the 384 well standard microplate, the sample volume can be considerably reduced, while the detection limit remains the same or is even improved.

TC surface treatment stands for a special physical procedure with which the surfaces of CELLSTAR® products for adherent cell culture are treated. This treatment leads to the incorporation of polar groups, such as carboxy and hydroxy groups, into the plastic surface making it hydrophilic. This enables the adhesion of cells to the plastic surface.

U-bottom stands for the well profile of wells with round bottom.

UV-Star® microplates are made of polyolefin and have a film bottom. In contrast to standard microplates with a solid bottom, they are characterised by an extended transparency range to as low as 200 nm.

Vapour diffusion is the most commonly used method for protein crystallisation. In this method a crystallisation droplet, formed by combining a protein solution with a reagent solution, is incubated together with a larger volume of the same reagent solution within a closed system. The reagent solution can contain a wide range of chemicals, e.g. buffers, salts or precipitating agents. Due to mixing the reagent and protein solutions, the concentration of reagents within the crystallisation droplet becomes lower than the concentration of the reagent solution itself. This causes water to evaporate out of the droplet until equilibrium is reached. During this process, the concentration of protein and chemicals in the crystallisation droplet is continuously rising, and, if optimal conditions have been chosen, protein crystals will begin to form. Vapour diffusion experiments are most often set up as → hanging or → sitting drop.

V-bottom stands for the well profile of wells with a conically tapered well bottom.

Glossary of Symbols


Manufacturer


Use-by date

Batch code

Catalogue number

Sterilised by irradiation

In vitro diagnostic medical device


Fragile, handle with care


Keep dry


This way up


Do not use if package is damaged


Temperature limit


Do not re-use


Consult instructions for use


Caution

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