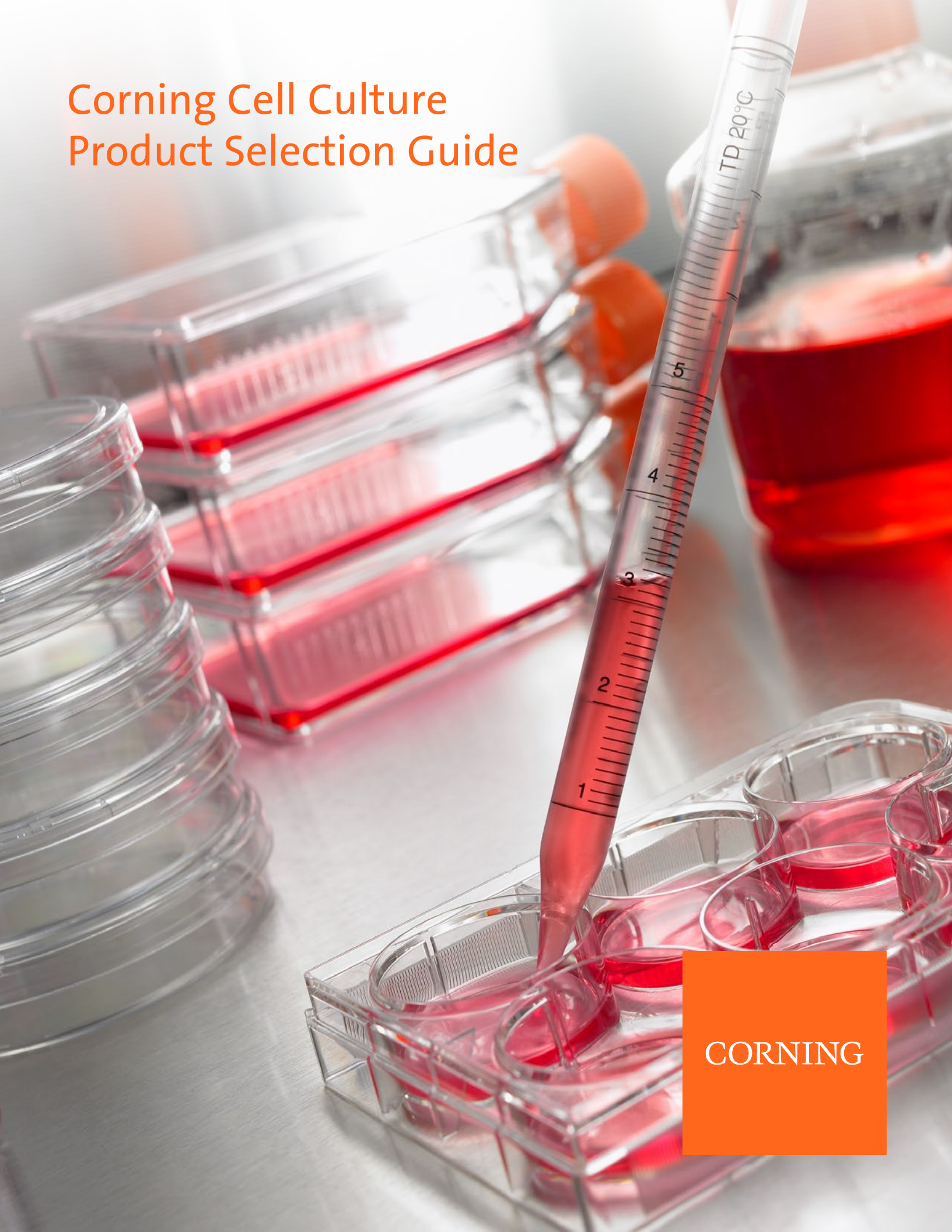
Corning Cell Culture Product Selection Guide



CORNING

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Product Ordering Information

For information on Purchasing Options, Terms and Conditions of Sale, Return and Repair Policies, and Warranty/Guarantee Registration, visit **www.corning.com/how-to-buy**.

Overview

DESIGNED FOR PERFORMANCE

Corning Life Sciences offers a full line of cell culture products that are manufactured under strict process controls guaranteeing consistent product performance.

In addition, customers can request a Certificate of Quality at **www.corning.com/lifesciences**. This certificate details lot-specific information on component materials, sterility testing, and pyrogen testing. Also available are detailed product descriptions and drawings that highlight product dimensions and testing procedures. All are available simply by calling your local Corning Life Sciences office.

ADDITIONAL QUALITY ASSURANCES

Nonpyrogenic Certification

Most Corning cell culture products are certified nonpyrogenic with a documented endotoxin level less than or equal to 0.1 EU/mL. Endotoxins have been shown to cause variability in cell culture. Nonpyrogenic certification is just another way Corning helps ensure consistent cell culture results. Corning also offers a detailed technical bulletin on the effects of endotoxins in cell culture. This may be obtained by calling your local Corning Life Sciences office or by downloading the bulletin from the Corning website **www.corning.com/lifesciences**.

Lot Number Traceability

To ensure accurate lot number traceability in biotechnology research and production facilities, most Corning cell culture flasks and most roller bottles feature a lot number individually printed on each product. Lot number traceability helps simplify quality assurance procedures for tracking and monitoring production and research processes.

Consistent Surface Chemistry

All Corning cell culture products are produced in ISO-certified facilities. Cell culture products are made from USP Class VI materials in accordance with documented manufacturing procedures. By carefully controlling both the materials we use and our manufacturing process, Corning is able to provide consistent surface chemistries across our entire line of cell culture products. This consistency increases the researcher's ability to produce reliable results.

Innovative Cell Culture Surfaces for the 21st Century

Corning® Surfaces

For over 30 years, Corning culture vessels have been modified using corona discharge and vacuum plasma to generate better surfaces for growing attached cells.

Today's culture technologies, such as stem cells and tissue engineering, require new surfaces with new capabilities. Corning's investments in developing surface technologies are paving the way for these cell culture applications. See for yourself why Corning is the first and only name to trust for surfaces that are backed with a performance guarantee.

Surfaces for Enhancing Cell Attachment

Corning CellBIND® Surface

The unique Corning CellBIND surface uses a microwave process for incorporating significantly more oxygen into the cell culture surface, rendering it better for cell attachment especially under difficult conditions.

- Quickly adapts cells to reduced serum or serum-free conditions
- Improves attachment and yield
- No special handling or storage required

Corning Synthemax™ Self-coating Substrate

Corning Synthemax self-coating substrate is a unique, animal-free, synthetic Vitronectin-based peptide containing the RGD motif and flanking sequences. The Synthemax substrate allows for scalable, multi-passage expansion of pluripotent stem cells in serum-free media, such as mTeSR®, subsequent to differentiation into a number of cell types, including retinal pigment epithelial cells and cardiomyocytes, as well as propagation of various progenitor cell types.

Corning Osteo Assay Surface

The Corning Osteo Assay surface is designed for:

- Direct assessment of osteoclast and osteoblast functional *in vitro* activity
- Osteoclast and osteoblast precursor differentiation
- Co-culture of osteoclast and/or osteoblasts with other cell lines
- Solution-based quantitative assays
- Studies related to bone remodeling and pit formation

Corning Microplates with Poly-D-Lysine-coated Surface

Corning Poly-D-Lysine (PDL) microplates are coated with PDL (molecular weight range of 70 to 150 kDa), giving the surface a net positive charge for better cell attachment.

- Improves differentiation of primary neurons, glial cells, neuroblastomas
- Enhances attachment of transfected cell lines, including HEK-293
- Helps cells stay attached during assay processing

Surfaces for Reducing or Preventing Cell Attachment

Corning Ultra-Low Attachment-coated Polystyrene Surface

The Corning Ultra-Low Attachment surface uses a covalently bound hydrogel layer to inhibit cell attachment.

- Growing primary cultures of tumor or adult stem cells as unattached spheroids
- Prevents anchorage-dependent cells, such as fibroblasts, from attaching and dividing
- Promoting embryoid body formation from ES cells

	Formats							
Corning Cell Culture Surfaces	Flasks	Dishes	Multiple Well Plates	Microplates	Corning CellSTACK® Culture Chambers	Corning HYPERFlask® Vessels	Cell Culture Tubes	Self-coating
For enhancing cell attachment:								
Original Tissue Culture (TC) surface	■	■	■	■	■		■	
Corning CellBIND surface	■	■	■	■	■	■		
Poly-D-Lysine-coated surface				■				
For reducing or preventing cell attachment:								
Ultra-Low Attachment surface	■	■	■	■	■			
For specialized cell needs:								
Corning Osteo Assay surface			■	■				
Corning Synthemax surface								■

For more information or product numbers, reference the format categories within this guide.

For other Corning surfaces, see the **Extracellular Matrices, Biologically Coated, and Permeable Support Inserts Product Selection Guide** (Corning Lit. Code CLS-C-DL-AC-012).

Corning® CellBIND® Surface

A Novel Surface for Improved Cell Attachment, Serum Reduction, or the Elimination of Coatings

Increase Cell Growth and Yields with Corning CellBIND Surface

The Corning CellBIND surface enhances cell attachment under difficult conditions, such as reduced-serum or serum-free medium, resulting in higher cell yields.

Developed by Corning scientists, this technology uses a microwave plasma process for treating the culture surface. This process improves cell attachment by incorporating significantly more oxygen into the cell culture surface, rendering it more hydrophilic (wettable) and increasing surface stability.

Benefits

- May eliminate the need for tedious, time-consuming, expensive and low stability biological coatings
- More quickly adapts cells to reduced-serum or serum-free conditions
- Increase cell survival following cryopreservation
- Reduces premature cell detachment from confluent cultures, especially in roller bottles
- Better cell attachment leads to increased cell growth and yields
- More consistent and even cell attachment
- Requires no refrigeration or special handling and is stable at room temperature

Same High Quality Standards as Other Corning Vessels

- Manufactured from optically clear polystyrene
- Rigorous QC testing for consistency and reproducibility
- Lot numbers for quality assurance and tracking
- Corning CellBIND surface logo differentiates from standard treatment cell culture products and avoids mix-ups
- Sterile
- Nonpyrogenic

Cell Dissociation Recommendations

Culture inoculating and harvesting should be performed in the same manner as methods currently being employed. Both enzymatic and non-enzymatic dissociating solutions have been successfully used to remove cells from Corning CellBIND surfaces. These include: Trypsin-EDTA, Accutase®, Versene®, Dispase®, and Citric Saline. Some dissociating agents, such as Dispase or Versene, should be removed by centrifugation prior to plating the cells.

Enhanced Attachment of LNCaP Cells to the Corning CellBIND Surface*

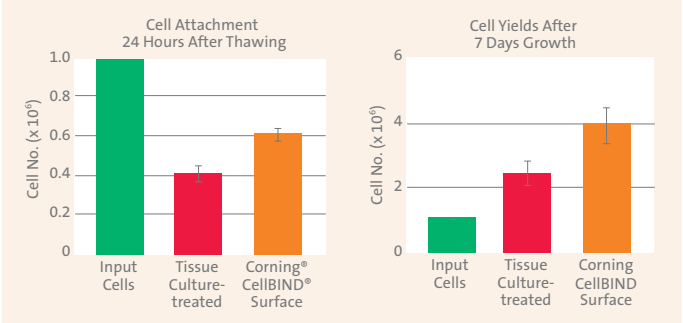


Figure 1. Left: Adherent cell recovery and growth of LNCaP cells 24 hours post-seeding. Data is average ± standard error from 3 independent experiments. Right: Average ± standard error from 3 independent experiments for 7 days of growth after initial attachment.

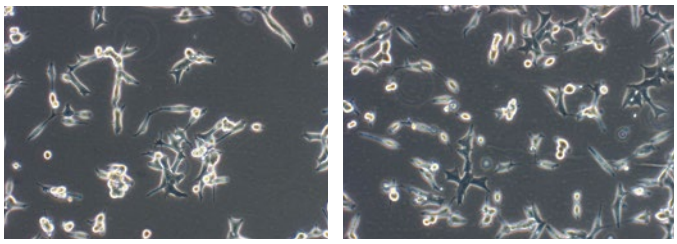


Figure 2. Attachment of LNCaP cells. Cells were thawed and plated onto the Corning CellBIND surface (right) or tissue culture-treated (left) T-25 flasks. 24 hours post-seeding a random field was viewed by light microscopy (100X magnification).

*From *Enhanced Attachment of LNCaP Cells to the Corning CellBIND surface*, (Corning Lit. Code CLS-AN-048).

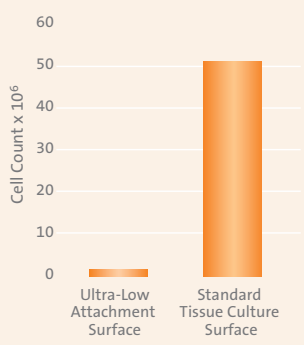
Corning CellBIND surface is available on flasks, multiple well plates, 96-well and 384-well microplates, and dishes.

For Corning CellBIND surface roller bottles and Corning CellSTACK® culture chambers, see the **Bioprocess Product Selection Guide** (Corning Lit. Code CLS-BP-028).

For Corning CellBIND surface microplates, see the **Microplates** section of this catalog or the **Microplates Product Selection Guide** (Corning Lit. Code CLS-C-DL-MP-014).

Ultra-Low Attachment Surface

For Dishes, Plates, Flasks, and Corning® CellSTACK® Culture Chambers



Comparison of cell attachment in Ultra-Low Attachment surface vs. standard tissue culture-treated plates.
Vero cells plated at 2.6 x 10^6 cells per well grown for 4 days at 37°C in a 5% CO_2 environment show a 99% reduction in cellular attachment vs. standard tissue culture-treated product.

The Ultra-Low Attachment surface is a unique covalently bonded hydrogel surface that is hydrophilic and neutrally charged. It minimizes cell attachment, protein absorption, and enzyme activation. The surface is noncytotoxic, biologically inert, and nondegradable.

Suggested working volumes for Ultra-Low Attachment surface products:

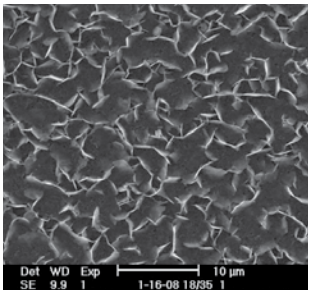
- 96-well plate: 0.1 mL to 0.2 mL/well
- 24-well plate: 0.4 mL to 0.6 mL/well
- 6-well plate: 1.9 mL to 2.9 mL/well
- 60 mm dish: 4.2 mL to 6.3 mL/dish
- 100 mm dish: 11.0 mL to 16.5 mL/dish
- 25 cm^2 flask: 5 mL to 7.5 mL/flask
- 75 cm^2 flask: 15 mL to 22.5 mL/flask
- 636 cm^2 chamber: 127 mL to 191 mL/flask

There are no special procedures that need to be followed in order to use this surface.

For Ultra-Low attachment surface microplates, see the **Microplates** section of this catalog or the **Microplates Product Selection Guide** (Corning Lit. Code CLS-C-DL-MP-014).

Corning Osteo Assay Surface

For Osteogenesis Research



Scanning electron micrograph of Corning Osteo Assay surface

The Corning Osteo Assay surface is a unique 3-dimensional structure that mimics *in vivo* bone for *in vitro* bone cell assays. This inorganic bone biomaterial surface in a multiple well plate is capable of supporting the functional properties of osteogenic cells. The assay surface is manufactured using a proprietary surface coating technology which delivers lot-to-lot consistency, translating to reliable and reproducible results in bone cell assays. This surface also offers a consistent and defined alternative to preparing dentine or bone slices, reducing the variability in your assay system and resulting in more predictable assay readouts.

The Corning Osteo Assay surface is designed for:

- Direct assessment of osteoclast and osteoblast functional *in vitro* activity
- Osteoclast and osteoblast precursor differentiation
- Co-culture of osteoclast and/or osteoblasts with other cell lines
- Solution-based quantitative assays
- Studies related to bone remodeling and pit formation

Cat. No.	Description	Qty/Pk	Qty/Cs
3987	24-well multiple well plate, Osteo Assay surface, polystyrene sterile, with proprietary coating	1	4
3989	1 x 8 Corning Stripwell™ microplate, Osteo Assay surface, polystyrene, 12 strips per holder with lid, sterile, with proprietary coating	1	2

For Corning Osteo Assay surface microplates, see the **Microplates** section of this catalog or the **Microplates Product Selection Guide** (Corning Lit. Code CLS-C-DL-MP-014).

Corning Synthemax™ Self-coating Substrate

Corning Synthemax self-coating substrate is a unique, animal-free, synthetic Vitronectin-based peptide containing the RGD motif and flanking sequences. The Synthemax substrate allows for scalable, multi-passage expansion of pluripotent stem cells in serum-free media, such as mTeSR®, subsequent to differentiation into a number of cell types, including retinal pigment epithelial cells and cardiomyocytes, as well as propagation of various progenitor cell types.

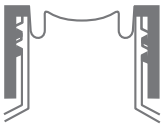
Cat. No.	Description	Qty/Pk	Qty/Cs
3535	Corning Synthemax II-SC substrate, 10 mg vial	1	1

Cell Culture Flasks

Corning® flasks are available in a variety of sizes, designs and cap styles to meet your needs.

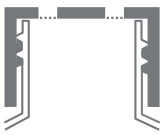
- Corning CellBIND® surface is a novel cell culture treatment that increases surface wettability for more even and consistent cell attachment.
- Ultra-Low Attachment surface flasks feature a covalently bound hydrogel layer that minimizes cell attachment, protein absorption and cellular activation.
- Manufactured from optically clear virgin polystyrene
- Treated for optimal cell attachment
- Printed lot numbers for traceability
- 100% integrity tested
- Sterile
- Nonpyrogenic

Flask Cap Styles



Plug seal caps feature one-piece linerless construction and are designed for use in closed systems, providing a liquid- and gas-tight seal. When loosened, this cap can also be used in open systems. This cap design was a Corning innovation that first appeared in 1974.

Phenolic-style caps are designed (when loosened) for use in open systems requiring gas exchange. With the caps slightly loosened, gas is exchanged between the environments inside and outside of the flask.



Vent caps contain a 0.2 µm pore, hydrophobic membrane sealed to the cap, isolating the container it is placed on from the environment while providing consistent gas exchange. These caps are highly recommended for use in all CO_2 incubators, especially for long-term use. The vent cap was a Corning innovation that first appeared in 1988.

Flask Neck Styles

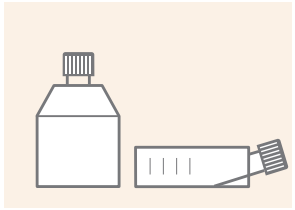
Straight neck flasks are ideal for larger medium volumes since this design reduces medium sloshing into the cap.

Canted neck flasks allow easier pouring and improved access to the flask for pipetting or scraping. The canted neck design was a Corning innovation that first appeared in 1974.

Angled neck flasks improve pipet access and reduce medium sloshing into the neck. This design was a Corning innovation that first appeared in 1988.

Flask Shapes

Choosing a flask shape is usually a matter of personal preference:



Rectangular flasks have a ramp from the bottom to the canted neck for easier pouring and pipet access. Most canted neck flasks also have an anti-tip skirt to enhance stability.

Angled neck and traditional straight neck flasks utilize the entire bottom area for cell growth. Their design saves on space and reduces medium sloshing into the neck.

U-shaped flasks have rounded shoulders for an easier grip and better access when removing or tightening the cap. The new ergonomic shape also reduces the number of corners, improves cell scraping, and allows the use of a larger pipet.

25 cm^2 flask, canted neck, vent cap (Cat. No. 430639)

75 cm^2 U-shaped flask, canted neck, vent cap (Cat. No. 430641U)

75 cm^2 U-shaped flask, canted neck, phenolic style cap (Cat. No. 430725U)

150 cm^2 U-shaped flask, canted neck, plug seal cap (Cat. No. 430823)

Cell Culture Flasks

25 cm^2 Growth Area Flasks

Cat. No.	Surface	Flask Style	Neck Style	Cap Style	Qty/Pk	Qty/Cs
430168	TC-treated	Rectangular	Canted	Plug seal	20	500
430372	TC-treated	Rectangular	Canted	Phenolic-style	20	500
430639	TC-treated	Rectangular	Canted	Vent	20	200
3289	Corning® CellBIND®	Rectangular	Canted	Vent	20	200
3815	Ultra-Low Attachment	Rectangular	Canted	Vent	6	24
431463	Not treated	Rectangular	Canted	Vent	20	200

75 cm^2 Growth Area Flasks

430641U	TC-treated	U-shaped	Canted	Vent	5	100
430720U	TC-treated	U-shaped	Canted	Plug seal	5	100
430725U	TC-treated	U-shaped	Canted	Phenolic-style	5	100
431464U	Not treated	U-shaped	Canted	Vent	5	100
3290	Corning CellBIND	U-shaped	Canted	Vent	5	100
3814	Ultra-Low Attachment	U-shaped	Canted	Vent	4	24

150 cm^2 Growth Area Flasks

430823	TC-treated	U-shaped	Canted	Plug seal	5	50
430824	TC-treated	U-shaped	Canted	Phenolic-style	5	50
430825	TC-treated	U-shaped	Canted	Vent	5	50
3291	Corning CellBIND	U-shaped	Canted	Vent	5	50
431465	Not treated	U-shaped	Canted	Vent	5	50

Cell Culture Tip

For technical cell culture application notes, visit **www.corning.com/lifesciences**.

Cell Culture Flask Application Tip

Corning recommends 0.2 mL to 0.3 mL of medium per cm^2 of growth area.

175 cm^2 U-shaped flask, angled neck, vent cap (Cat. No. 431466)

225 cm^2 angled neck flask with vent cap (Cat. No. 431082)

1720 cm^2 Corning HYPER*Flask* vessel (Cat. No. 10024)

175 cm^2 Growth Area Flasks

Cat. No.	Surface	Flask Style	Neck Style	Cap Style	Qty/Pk	Qty/Cs
431079	TC-treated	U-shaped	Angled	Plug seal	5	50
431080	TC-treated	U-shaped	Angled	Vent	5	50
431085	TC-treated	U-shaped	Angled	Phenolic-style	5	50
431306*	TC-treated	Rectangular	Angled	Vent	7	84
431328*	Corning® CellBIND®	Rectangular	Angled	Vent	7	84
3292	Corning CellBIND	U-shaped	Angled	Vent	5	50
431466	Not treated	U-shaped	Angled	Vent	5	50

*Flask pre-labeled with bar code, validated for use with SelecT™ robotic system.

225 cm^2 Growth Area Flasks

Cat. No.	Surface	Flask Style	Neck Style	Cap Style	Qty/Pk	Qty/Cs
431081	TC-treated	Traditional	Angled	Plug seal	5	25
431082	TC-treated	Traditional	Angled	Vent	5	25
3293	Corning CellBIND	Traditional	Angled	Vent	5	25

1720 cm^2 Growth Area Corning HYPER*Flask*® Vessel

Cat. No.	Description	Surface	Type	Qty/Pk	Qty/Cs
10024	HYPER*Flask* vessel	Corning CellBIND	Bar code, sterile	4	24
10030	HYPER*Flask* M vessel	Corning CellBIND	Bar code, sterile	1	4
10020	HYPER*Flask* M vessel	Corning CellBIND	Bar code, sterile	4	4
10034	HYPER*Flask* M vessel	Corning CellBIND	Bar code, sterile	4	24
10031	HYPER*Flask* M vessel	Not treated	Bar code, sterile	1	4
10035	33 mm caps	N/A	Not vented, sterile	1	4

*Flask pre-labeled with bar code for use with SelecT™ robotic system.

Cell Yields and Recommended Medium Volume

Corning Flasks	Approximate Growth Area (cm^2)	Average Cell Yield*	Recommended Medium Volume (mL)
25 cm^2	25	2.5×10^6	5 - 7.5
75 cm^2	75	7.5×10^6	15 - 22.5
150 cm^2	150	1.5×10^7	30 - 45
175 cm^2	175	1.75×10^7	35 - 52.5
225 cm^2	225	2.25×10^7	45 - 67.5
1720 cm^2	1720	2.5×10^8	565

*Assumes an average yield of 1×10^5 cells/cm^2 from a 100% confluent culture. Yields from many cell types can be lower than this.

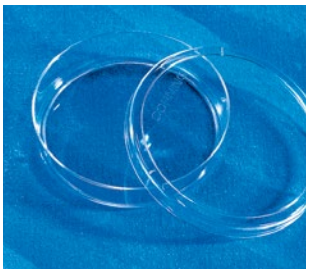
Cell Culture Flask Selection Tip

The novel Corning HYPER*Flask* vessel offers high yield and high performance with 10 growth surfaces and 1720 cm^2 growth area in the same footprint as the 175 cm^2 flask.

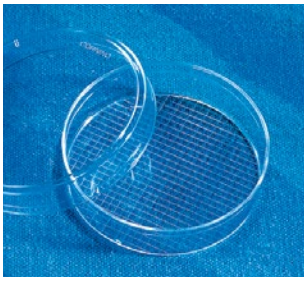
For Falcon® flasks, see the **Falcon Product Selection Guide** (Corning Lit. Code CLS-F-PSG-001).

For flasks with other surfaces, see the **Extracellular Matrices, Biologically Coated, and Permeable Support Inserts Product Selection Guide** (Corning Lit. Code CLS-C-DL-AC-012).

Cell Culture Dishes



100 mm dishes coated with Corning CellBIND surface (Cat. No. 3296)



Gridded 60 mm dish (Cat. No. 430196)

500 cm^2 cell culture dish (Cat. No. 431110)

245 mm x 245 mm bioassay dish (Cat. No. 431111)

Treated Cell Culture Dishes

- Corning® CellBIND® surface is a novel cell culture treatment that increases surface wettability for more even and consistent cell attachment
- Ultra-Low Attachment surface dishes feature a covalently bound hydrogel layer that minimizes cell attachment, protein absorption, and cellular activation
- 10 dishes/bag are available for 100 mm dishes (Cat. No. 430293)
- 245 mm square dishes offer 500 cm^2 growth surface
- Stacking beads aid in handling
- Vents provide consistent gas exchange
- Manufactured from optically clear virgin polystyrene
- Sterile
- Nonpyrogenic

Cat. No.	Surface	Dish Style* (mm)	Approx. Height (mm)	Growth Area (cm^2)	Qty/Pk	Qty/Cs
3294	Corning CellBIND	35	10	9	10	210
430165	TC-treated	35	10	9	20	500
430166	TC-treated	60	15	21	20	500
3295	Corning CellBIND	60	15	21	7	126
3261	Ultra-Low Attachment	60	15	21	5	20
430196	TC-treated	60 with 2 mm grid	15	21	20	500
3262	Ultra-Low Attachment	100	20	55	5	20
3296	Corning CellBIND	100	20	152	5	40
430167	TC-treated	100	20	55	20	500
430293	TC-treated	100	20	55	10	480
430599	TC-treated	150	25	150	5	60
431110†	TC-treated	245	25	500	4	16

*Dish style (mm) = actual growth surface diameters: 35 mm dish = 34.4 mm; 60 mm dish = 52.1 mm; 100 mm dish = 83.8 mm; 150 mm dish = 139.1 mm.
†Square dishes with interior bottom dimensions of 224 x 224 mm.

245 mm Square Bioassay Dishes

Square bioassay dishes are made from polystyrene and are nonpyrogenic. They are packed with lids and are designed with a stacking bead so that they will stack securely without slipping. The dishes are compatible with automated colony picking instruments.

Cat. No.	Description	Automation Compatibility	Qty/Pk	Qty/Cs
431111	245 mm x 245 mm, square, 18 mm deep not treated dish, sterile	PBA Flexys™ and Genetix "Q" Bot® automated colony picking and gridding robots	4	16
431272	245 mm x 245 mm, square, 18 mm deep not treated dish, sterile	AutoGen AutoGenesys, BioRobotics BioPick, BioGrid, TAS, and MicroGrid II high volume automated colony picking systems	4	16
431301	245 mm x 245 mm, low profile, not treated dish, sterile	PBA Flexys, Genetix "Q" Bot, BioRobotics BioPick	5	20

Not Treated Cell Culture Dishes

- Manufactured from optically clear virgin polystyrene
- Not treated for applications where cell attachment is not desired
- Stacking beads aid in handling
- Vents provide consistent gas exchange.
- Sterile
- Nonpyrogenic

Cell Culture Dish Application Tips

- The 150 mm and 245 mm culture dishes make excellent carriers and incubator trays for 35 mm and 60 mm dishes. This helps prevent spills and reduces opportunities for contamination.
- Corning recommends 0.2 mL to 0.3 mL of medium per cm^2 of growth area.

Cat. No.	Dish Style* (mm)	Height (mm)	Approx. Growth Area (cm^2)	Qty/Pk	Qty/Cs
430588	35	10	9	20	500
430589	60	15	21	20	500
430591	100	20	55	20	500
430597	150	25	152	5	60
431111†	245	25	500	4	16

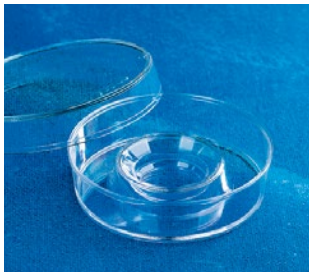
*Note: Dish style (mm) = actual growth surface diameters: 35 mm dish = 34.4 mm; 60 mm dish = 52.1 mm; 100 mm dish = 83.8 mm; 150 mm dish = 139.1 mm.
†Square dish with interior bottom plate dimensions of 224 x 224 mm.

Expected Cell Yields and Recommended Medium Volumes

Corning Dishes	Approximate Growth Area (cm^2)	Average Cell Yield*	Recommended Medium Volume (mL)
35 mm	8	8.0×10^5	1.6 - 2.4
60 mm	21	2.1×10^6	4.2 - 6.3
100 mm	55	5.5×10^6	11 - 16.5
150 mm	152	1.52×10^7	30.4 - 45.6
245 mm (square)	500	5.0×10^7	100 - 150

*Assumes an average yield of 1×10^5 cells/cm^2 from a 100% confluent culture. Yields from many cell types can be lower than this.

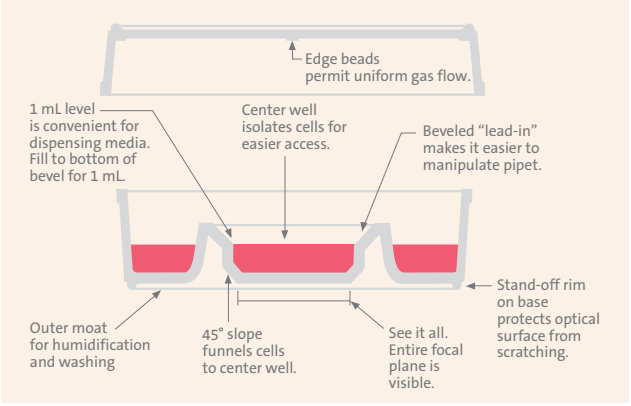
Costar® 60 mm Center Well Culture Dish



Costar 60 mm center well dish (Cat. No. 3260)

Product is strictly not for human use in *in vitro* fertilization or assisted reproduction procedures. For research only. Not for use in diagnostic or therapeutic procedures.

- 20 mm center well
- Inner well holds 3 mL of medium, while the outer well holds 10 mL
- Treated for optimal cell attachment
- Sterile
- Nonpyrogenic

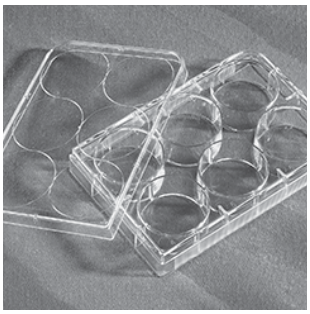


Cat. No.	Size (mm)	Description (mm)	Center Well (mm)	Qty/Pk	Qty/Cs
3260	60	60 x 15	20	20	500

For IVF products, see the **Falcon® Product Selection Guide** (Corning Lit. Code CLS-F-PSG-001).

For dishes with other surfaces, see the **Extracellular Matrices, Biologically Coated, and Permeable Support Inserts Product Selection Guide** (Corning Lit. Code CLS-C-DL-AC-012).

Multiple Well Plates



6-well culture plate
(Cat. No. 3516)

12-well culture plate
(Cat. No. 3513)

24-well culture plate
(Cat. No. 3524)

48-well culture plate
(Cat. No. 3548)

Costar® 6-, 12-, 24-, and 48-well Cell Culture Plates

- Individual alphanumerical codes for well identification, flat bottoms
- Treated for optimal cell attachment (except where noted)
- Corning® CellBIND® surface is a novel cell culture treatment that increases surface wettability for more even and consistent cell attachment.
- Ultra-Low Attachment surface plates feature a covalently bound hydrogel layer that minimizes cell attachment, protein absorption, and cellular activation.
- Corning Osteo Assay surface is an inorganic crystalline coating, creating a surface that mimics *in vivo* bone-like, for *in vitro* bone cell culture and assays.
- Sterile
- Nonpyrogenic

Cat. No.	Surface	Plate Type	Qty/Pk	Qty/Cs
6-well				
3335	Corning CellBIND	Standard clear	5	50
3506	TC-treated	Standard clear	5	100
3516	TC-treated	Standard clear	1	50
3471	Ultra-Low Attachment	Standard clear with hydrogel*	1	24
3736	Not treated	Standard clear	5	100
12-well				
3336	Corning CellBIND	Standard clear	5	50
3512	TC-treated	Standard clear	5	100
3513	TC-treated	Standard clear	1	50
3737	Not treated	Standard clear	5	100
24-well				
3337	Corning CellBIND	Standard clear	5	50
3524	TC-treated	Standard clear	1	100
3526	TC-treated	Standard clear	1	50
3527	TC-treated	Standard clear	5	100
3473	Ultra-Low Attachment	Standard with hydrogel*	1	24
3987	Corning Osteo Assay	Standard clear	1	4
3738	Not treated	Standard clear	5	100
48-well				
3338	Corning CellBIND	Standard clear	5	50
3548	TC-treated	Standard clear	1	100

*This covalently bonded hydrogel surface minimizes cell attachment, protein absorption, enzyme activation, and cellular activation. The surface is noncytotoxic, biologically inert, and nondegradable.

Well Dimensions, Expected Cell Yields, and Recommended Medium Volumes

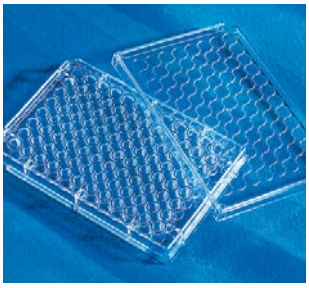
		Single Well Only				Entire Plate		
Cell Culture Plates	Well Bottom Diameter (mm)	Approx. Growth Area (cm^2)	Average Cell Yield*	Total Well Volume (mL)	Working Volume (mL)	Approx. Growth Area (cm^2)	Average Cell Yield*	Working Volume (mL)
6-well	34.8	9.5	9.5×10^5	16.8	1.9 - 2.9	57	5.7×10^6	11.4 - 17.1
12-well	22.1	3.8	3.8×10^5	6.9	0.760 - 1.14	45.6	4.56×10^6	9.1 - 13.7
24-well	15.6	1.9	1.9×10^5	3.4	0.380 - 0.570	45.6	4.56×10^6	9.1 - 13.7
48-well	11	0.95	9.5×10^4	1.6	0.19 - 0.285	45.6	38.4×10^6	9.1 - 13.7

*Assumes an average yield of 1×10^5 cells/cm^2 from a 100% confluent culture. Yields from many cell types can be lower than this.

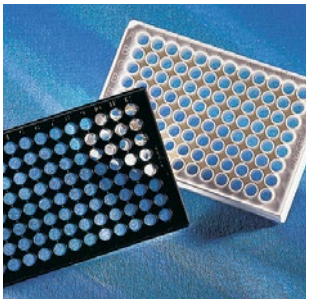
For Falcon® multiple well plates, see the **Falcon Product Selection Guide** (Corning Lit. Code CLS-F-PSG-001).

For multiple well plates with other surfaces, see the **Extracellular Matrices, Biologically Coated, and Permeable Support Inserts Product Selection Guide** (Corning Lit. Code CLS-C-DL-AC-012).

Cell Culture Microplates



96-well culture microplate



96-well clear-bottom microplates

Corning® 96-well Cell Culture Microplates

- Non-reversable lids with condensation rings (except where noted)
- Individual alphanumeric codes for well identification, flat bottoms (except where noted)
- Treated for optimal cell attachment (except where noted)
- Corning CellBIND® surface is a novel cell culture treatment that increases surface wettability for more even and consistent cell attachment.
- Ultra-Low Attachment surface microplates feature a covalently bound hydrogel layer that minimizes cell attachment, protein absorption and cellular activation.
- Corning Osteo Assay surface is an inorganic crystalline coating, creating a surface that mimics *in vivo* bone, for *in vitro* bone cell assays.
- Corning Poly-D-Lysine (PDL) microplates are coated with PDL (molecular weight range of 70 to 150 kDa) giving the surface a net positive charge for better cell attachment.
- Sterile
- Nonpyrogenic

Black microplates are designed to lower background in fluorescent assays and reduce cross-talk. White microplates are designed for luminescent assays. Some microplates have the Corning CellBIND surface or a PDL coating to enhance cell attachment. Corning offers many other 96-well microplate types for applications other than cell culture. For a complete listing, visit **www.corning.com/lifesciences.**

96-well Microplate Dimensions, Expected Cell Yields, and Recommended Medium Volume

		Single Well Only				Entire Microplate		
Cell Culture Microplate	Well Diameter (Bottom, mm)	Approx. Growth Area (cm^2)	Average Cell Yield*	Total Well Volume (mL)	Working Volume (mL)	Approx. Growth Area (cm^2)	Average Cell Yield*	Working Volume (mL)
96-well flat bottom	6.4	0.32	3.2×10^4	0.36	0.100 - 0.200	30.7	3.07×10^6	9.6 - 19.2
96-well round bottom	6.4	NA†	NA†	0.33	0.100 - 0.200	NA†	NA†	9.6 - 19.2
96-well V-bottom	6.4	0.38	3.8×10^4	0.29	0.100 - 0.200	36.5	3.65×10^6	9.6 - 19.2
96 half area	4.5	0.16	1.6×10^4	0.19	0.050 - 0.100	15.4	1.54×10^6	4.8 - 9.6

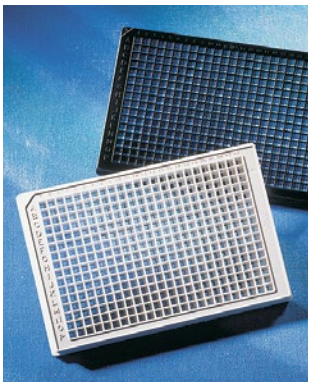
*Assumes an average yield of 1×10^5 cells/cm^2 from a 100% confluent culture. Yields from many cell types can be lower than this.
†Because these wells are round, the surface area available for cell attachment is dependent on the medium volume used.

For Falcon® 96-well microplates, see the **Falcon® Product Selection Guide** (Corning Lit. Code CLS-F-PSG-001).

For 96-well microplates, see the **Microplates Product Selection Guide** (Corning Lit. Code CLS-C-DL-MP-014).

For 96-well microplates with other surfaces, see the **Extracellular Matrices, Biologically Coated, and Permeable Support Inserts Product Selection Guide** (Corning Lit. Code CLS-C-DL-AC-012).

Corning® 384-well Cell Culture Microplates



- Flat bottom with lid
- Low volume microplates have only a 50 µL total well volume, with recommended working volume of 5 to 40 µL
- Treated for optimal cell attachment
- Sterile
- Nonpyrogenic

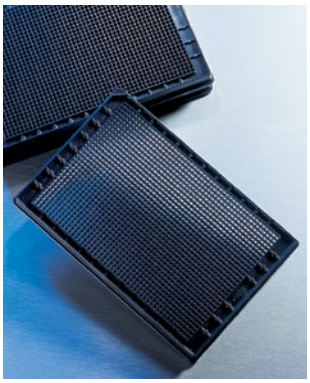
Black microplates are designed to lower background in fluorescent assays and reduce cross-talk. White microplates are designed for luminescent assays. Some microplates have the Corning CellBIND® surface or a Poly-D-Lysine coating to enhance cell attachment. Corning offers many other 384-well microplate types for applications other than cell culture. For a complete listing, visit **www.corning.com/lifesciences.**

384-well Microplate Dimensions, Expected Cell Yields, and Recommended Medium Volumes

		Single Well Only				Entire Microplate		
Cell Culture Microplate	Well Bottom Diameter (mm)	Approx. Growth Area (cm^2)	Average Cell Yield*	Total Well Volume (mL)	Working Volume (mL)	Approx. Growth Area (cm^2)	Average Cell Yield*	Working Volume (mL)
Standard 384-well	2.7 x 2.7†	0.056	5.6×10^3	0.125	0.025 - 0.050	21.5	2.15×10^6	9.6 - 19.2
Low Volume 384-well	2.0	0.031	3.1×10^3	0.050	0.005 - 0.040	12.0	1.2×10^6	1.9 - 15.3

*Assumes an average yield of 1×10^5 cells/cm^2 from a 100% confluent culture. Yields from many cell types can be lower than this.
†These wells are square.

Corning 1536-well Cell Culture Microplates



- Superior performance compared to competitor microplates: lower CV values, higher signal-to-noise ratios, and lower background fluorescence
- Compatible with bar coding, standard readers, and automation
- Recommended working volume of up to 8 µL
- Treated for optimal cell attachment
- Flat bottom with lid
- Sterile
- Nonpyrogenic

Black microplates are designed to lower background in fluorescent assays and reduce cross-talk. White microplates are designed for luminescent assays. Corning offers other 1536-well microplate types for applications other than cell culture. For a complete listing, visit **www.corning.com/lifesciences**.

1536-well Microplate Dimensions, Expected Cell Yields, and Recommended Medium Volumes

		Single Well Only				Entire Microplate		
Cell Culture Microplate	Well Bottom Diameter (mm)	Approx. Growth Area (cm^2)	Average Cell Yield*	Total Well Volume (mL)	Working Volume (mL)	Approx. Growth Area (cm^2)	Average Cell Yield*	Working Volume (mL)
1536-well Clear Flat Bottom	1.63 x 1.63	0.025	2.5×10^3	12.5	5 - 8	38.3	3.8×10^6	7.7 - 15.4
1536-well Solid Flat Bottom	1.53 x 1.53	0.023	2.3×10^3	12.5	5 - 8	35.3	3.5×10^6	7.7 - 15.4

*Assumes an average yield of 1×10^5 cells/cm^2 from a 100% confluent culture. Yields from many cell types can be lower than this.

For Falcon® 384- and 1536-well microplates, see the **Falcon Product Selection Guide** (Corning Lit. Code CLS-F-PSG-001).

For 384- and 1536-well microplates, see the **Microplates Product Selection Guide** (Corning Lit. Code CLS-C-DL-MP-014).

For 384- and 1536-well microplates with other surfaces, see the **Extracellular Matrices, Biologically Coated, and Permeable Support Inserts Product Selection Guide** (Corning Lit. Code CLS-C-DL-AC-012).

For more specific information on claims, visit **www.corning.com/certificates**.

Transwell® Permeable Supports

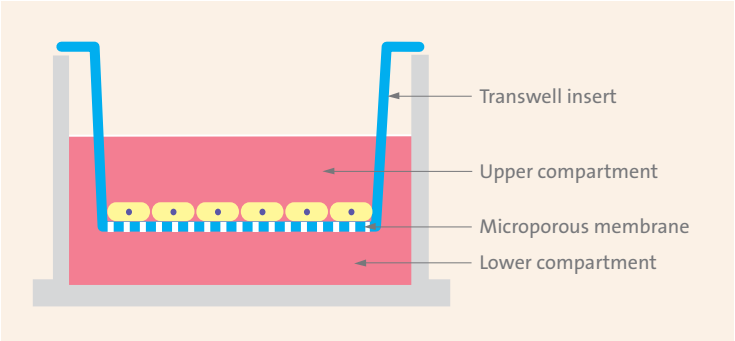
Permeable supports, also known as cell culture inserts, are an essential tool for the study of both anchorage-dependent and independent cell lines.

You can use cell culture inserts to:

- Produce a cell culture environment that closely resembles an *in vivo* state
- Allow polarized cells to carry out metabolic activities in a more natural manner because the cells feed both apically and basolaterally
- Co-culture cells with or without cell-to-cell contact
- Design a diversity of experiments using various pore sizes, membrane types, and coatings

This selection guide will help you choose the right combination of membrane type, pore size, format, and surface treatment to create a cell culture environment that more closely mimics the *in vivo* environment you desire.

Create a More Natural Environment for Your Cells



The unique, self-centered hanging design of Transwell inserts prevents medium wicking between the insert and outer well. The design also permits access to the lower compartment through windows in the insert wall, as well as undamaged co-culturing of cells in the lower compartment.

Transwell Permeable Supports: a Laboratory Standard

Transwell inserts are convenient, ready-to-use permeable support devices pre-packaged in standard multiple well plates. The unique, self-centered hanging design prevents medium wicking between the insert and outer well. Transwell inserts are available in a wide variety of sizes, membrane types, and configurations, and they are backed by extensive citations, protocols, and technical support—all of which has helped to make them the leading brand of cell culture insert for more than 25 years.

Follow these four steps to select the optimal insert for your research.

1. Select a Membrane

Permeable supports are available in three materials of construction:

PC (Polycarbonate)

Transwell® Permeable Supports are available in a broad range of pore sizes from 0.4 to 8.0 µm. This high pore density membrane is suitable for a variety of applications. It allows for maximum diffusion when studying transport, secretions, or drug uptake.

PET (Polyester or Polyethylene Terephthalate)

Transwell-Clear inserts permit sufficient optical transparency for visualization of cell outlines by phase contrast microscopy.

Consult the product specification tables for more information.

2. Select a Pore Size

In general, smaller pore sizes (0.4 µm and 1.0 µm) are used for culturing cells, co-culture applications, and drug transport studies. Larger pore sizes (3.0 µm to 8.0 µm) are recommended for chemotaxis and angiogenesis applications. Please refer to the Applications guide for more information.

Application	Cell Type	Pore Size (µm)
Angiogenesis	Endothelial, HMVEC, HUVEC	3.0
Co-culture	Stem, neuronal, and various others	0.4, 1.0
Epithelial Cell Polarity	Epithelial cells	0.4
Migration	Endothelial, HUVEC, HMVEC Neutrophils, PMNs Lymphocytes, macrophages, monocytes Neuronal cells Dendritic cells Neurite outgrowth Epithelial fibroblasts Leukocytes Smooth muscle	3.0 3.0 3.0, 5.0 3.0 3.0, 5.0, 8.0 1.0, 3.0 8.0 3.0, 5.0 8.0
Invasion	Melanoma Glioma Lymphoma, Jurkat Osteoblasts Breast cancer Endothelial	8.0 8.0 5.0, 8.0 8.0 5.0, 8.0 3.0, 5.0, 8.0
Tissue Engineering/Air-Liquid Interface	Human skin model: Airway epithelial cells, disease model (e.g., COVID-19)	0.4, 3.0
Toxicity Testing	Mouse fibroblasts Human lung	3.0 0.4
Transport and Permeability Studies	Caco-2 MDCK	0.4, 1.0 0.4, 1.0

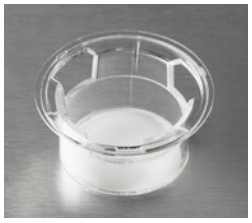
3. Select a Format

- Individual inserts are used with 6-, 12-, and 24-well plates. A large, single-well format is also available in a 100 mm dish.
- HTS insert plates are available in either 24- or 96-well formats with special receiver plates and single-well reservoirs to facilitate automation and ease of handling.
- Snapwell™ inserts are designed for use with diffusion or Ussing chambers.
- Netwell™ inserts are used as tissue carriers or explants at the air-media interface. The inserts are available in 6- or 12-well plates.

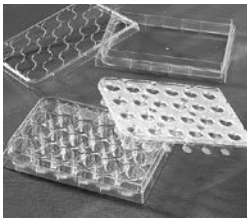
Growth Area Guide for Transwell® Inserts

Insert Diameter (mm)*	Multiple Well Plate or Dish Style	Insert Membrane Growth Area (cm^2)
4.26	96-well	0.143
6.5	24-well	0.33
12	12-well	1.12
24	6-well	4.67
75	100 mm dish	44

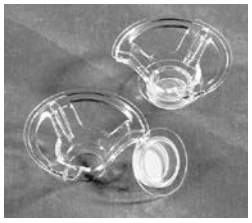
*Values are reported as nominal and may vary due to inherent variability of our manufacturing process. To ensure success, we recommend that researchers validate their methods independent from our reported values.



Individual inserts for 6-, 12-, or 24-well plates or 100 mm dishes



HTS insert plates for automation and ease of handling



Snapwell inserts for use in diffusion or Ussing chambers

INDIVIDUAL TRANSWELL® INSERTS

24 mm and 6.5 mm Transwell inserts

Characteristics of Individual Transwell Inserts

Pore Size (µm)	0.4	0.4	3.0	3.0	5.0	8.0	8.0
Membrane	PET	PC	PET	PC	PC	PC	PET
Pore Density	4×10^6	1×10^8	2×10^6	2×10^6	4×10^5	1×10^5	1×10^5
Opacity	Clear	Translucent	Clear	Translucent	Translucent	Translucent	Clear
1-well		■		■			
6-well	■	■	■	■		■	
12-well	■	■	■	■			
24-well	■	■	■	■	■	■	■

Transwell Polycarbonate (PC) Membrane Inserts

12 mm polycarbonate Transwell inserts (Cat. No. 3401)

- 10 µm thick translucent membrane
- Pore sizes ranging from 0.4 µm to 8.0 µm diameters
- Treated for optimal cell attachment
- Supplied in multiple well plates
- Membrane must be stained for cell visibility
- Sterile

75 mm polycarbonate Transwell insert (Cat. No. 7910)

Cat. No.	Description	Membrane Pore Size (µm)	Qty/Pk	Qty/Cs
3412	Inserts in 6-well plates	0.4	6/plate	24
3414	Inserts in 6-well plates	3.0	6/plate	24
3428	Inserts in 6-well plates	8.0	6/plate	24
3401	Inserts in 12-well plates	0.4	12/plate	48
3402	Inserts in 12-well plates	3.0	12/plate	48
3413	Inserts in 24-well plates	0.4	12/plate*	48
3415	Inserts in 24-well plates	3.0	12/plate*	48
3421	Inserts in 24-well plates	5.0	12/plate*	48
3422	Inserts in 24-well plates	8.0	12/plate*	48
7910	Inserts in 100 mm dish	0.4	1/dish	12
3420	Inserts in 100 mm dish	3.0	1/dish	12

*6.5 mm membrane diameter are packaged 12 inserts in a 24 well plate, 4 plates per case.

Transwell-Clear Polyester (PET) Membrane Inserts

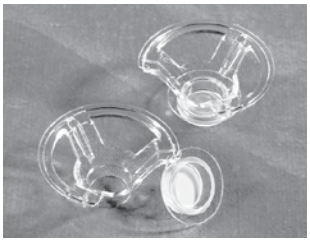
24 mm PET Transwell inserts

- 10 µm transparent membrane
- TC-treated for optimal cell attachment and growth
- Better cell visibility under phase contrast microscopy
- Supplied in multiple well plates
- Sterile

Cat. No.	Description	Membrane Pore Size (µm)	Qty/Pk	Qty/Cs
3450	Inserts in 6-well plates	0.4	6/plate	24
3452	Inserts in 6-well plates	3.0	6/plate	24
3460	Inserts in 12-well plates	0.4	12/plate	48
3462	Inserts in 12-well plates	3.0	12/plate	48
3470	Inserts in 24-well plates	0.4	12/plate*	48
3472	Inserts in 24-well plates	3.0	12/plate*	48
3464**	Inserts in 24-well plates	8.0	12/plate*	48

*6.5 mm membrane diameter are packaged 12 inserts in a 24-well plate, 4 plates per case.
**Membrane surface suitable for cell culture.

Snapwell™ Inserts*


Polycarbonate Snapwell Inserts


Polyester Snapwell Inserts

The Snapwell insert is a modified Transwell culture insert that contains a 12 mm diameter tissue culture-treated membrane supported by a detachable ring. The inserts are primarily used for transport and electrophysiological studies. Once cells are grown to confluence, this ring-supported membrane can be placed into either vertical or horizontal diffusion or Ussing chambers.

Characteristics of Snapwell Insert Membranes

Pore Size (µm)	0.4	0.4
Membrane	PET	PC
Pore density	4 x 10^6	1 x 10^8
Opacity	Clear	Translucent
Inserts for 6-well plates	■	■

Cat. No.	Description	Membrane Pore Size (µm)	Qty/Pk	Qty/Cs
3407	PC inserts in 6-well plates	0.4	6	24
3801	Clear PET inserts in 6-well plates	0.4	6	24

*Diffusion chambers are available through Harvard Apparatus (www.harvardapparatus.com)

Netwell™ Inserts

Netwell Inserts have polyester (PET) mesh bottoms attached to a polystyrene ring or housing. They are used as tissue carriers, supports and strainers for culture of small organs, tissue slices, or explants at the air-media interface. They can be used to coarse filter tissue homogenates, cell suspensions, or microcarriers. Accessories allow them to be used as a handy carrier for immunocytochemical staining of tissue culture slices.

Characteristics of Netwell Inserts

Mesh Size (µm)	74	440
Mesh Material	PET	PET
Sterile	Yes	Yes
Inserts for 6- and 12-well Plates	■	■

Cat. No.	Description	Membrane	Membrane Pore Size (µm)	Qty/Pk	Qty/Cs
3479	Inserts in 6-well plates	PET	74	6/plate	48
3480	Inserts in 6-well plates	PET	440	6/plate	48
3477	Inserts in 12-well plates	PET	74	12/plate	48
3478	Inserts in 12-well plates	PET	440	12/plate	48

Netwell Accessories

- Specially designed Netwell carriers and handles allow simultaneous processing of up to 12 samples per carrier
- Polystyrene reagent trays are available in white for colorimetric reaction contrast, or black for better visibility of tissue sections
- Each carrier kit contains eight carriers and eight handles

Cat. No.	Description	Qty/Cs
3517	Netwell reagent tray, black	200
3519	Netwell reagent tray, white	200
3521	Netwell 6-well carrier kit, for 24 mm inserts	8
3520	Netwell 12-well carrier kit for 15 mm inserts	8

For permeable support inserts, see the **Extracellular Matrices, Biologically Coated, and Permeable Support Inserts Product Selection Guide** (Corning Lit. Code CLS-C-DL-AC-012).

For Falcon® uncoated individual inserts, see the **Falcon Product Selection Guide** (Corning Lit. Code CLS-F-PSG-001) or the **Permeable Supports Selection Guide** (Corning Lit. Code CLS-CC-027).

TRANSWELL® SUPPORT SYSTEMS

HTS Transwell-24 Permeable Supports

HTS Transwell-24 insert plates

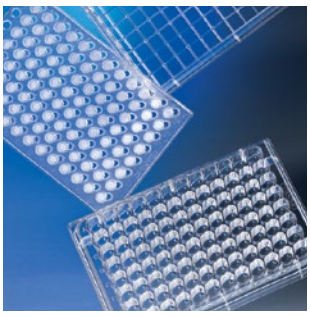
HTS insert plates are arrays of individual cell culture inserts connected by a rigid, robotics-friendly holder. This single-unit design makes insert plates ideal for running automated, high throughput drug transport (Caco-2 cells) cell toxicity studies or cell migration and invasion studies.

- The HTS Transwell-24 permeable support has an array of 24 wells with membrane inserts connected by a rigid, robotics-friendly tray that enables all 24 Transwell supports to be handled as a single unit.
- Cell growth area is 0.33 cm^2/well.
- Polyester (PET) membrane (0.4 µm pore size) or polycarbonate (PC) membrane (0.4 µm and 3.0 µm pore sizes) are available.
- Treated for optimal cell attachment
- Individual pack has two HTS Transwell-24 units loaded into two open reservoir trays and two individually wrapped 24-well plates.
- Bulk pack has 12 HTS Transwell-24 units loaded into 24-well plates only. Reservoirs may be purchased separately.
- Sterile

Characteristics of HTS Insert Plates

Pore Size (µm)	0.4	0.4	1.0	3.0	5.0	8.0
Membrane	PET	PC	PET	PC	PC	PET
Pore Density	4 x 10^6	1 x 10^8	1.6 x 10^6	2 x 10^6	4 x 10^5	1 x 10^5
Opacity	Clear	Translucent	Clear	Translucent	Translucent	Clear
24-well	■	■		■		
96-well		■	■	■	■	■

Cat. No.	Description	Membrane Pore Size (µm)	Qty/Pk	Qty/Cs
3396	HTS Transwell-24, individual, polycarbonate (PC)	0.4	1	2
3397	HTS Transwell-24, bulk, PC	0.4	12	12
3378	HTS Transwell-24, bulk, PET	0.4	12	12
3379	HTS Transwell-24, individual, PET	0.4	1	2
3398	HTS Transwell-24, individual, PC	3.0	1	2
3399	HTS Transwell-24, bulk, PC	3.0	12	12
3395	HTS Transwell nontreated reservoir	–	12	48
4395	HTS Transwell-24, TC-treated reservoir with lid	–	12	48



HTS Transwell-96 insert plates

HTS Transwell®-96 Permeable Support Systems and Plates

- The HTS Transwell-96 permeable support has an array of 96-wells with membrane inserts connected by a rigid, robotics-friendly tray that enables all 96 inserts to be handled as a single unit.
- Polyester (PET) membrane (0.4 µm, 1.0 µm, and 8.0 µm pore sizes) or polycarbonate (PC) membrane (0.4 µm, 3.0 µm, and 5.0 µm pore sizes) are available.
- The 0.143 cm^2 membrane area per well provides 20% to 50% more surface area for cell growth than other commercially available systems.
- Large apical and basolateral access ports allow efficient media sampling and facilitate automated or manual access.
- Optimized for automation, with multichannel feeder ports, improved gripping surface, and standard bar codes.
- The reservoir plate allows for simultaneous feeding of 96 wells and comes with a removable media stabilizer to reduce the risk of spills during handling.
- The receiver plate isolates each well to enable 96 individual assays.
- The HTS Transwell-96 systems (0.4 µm PC, 0.4 µm PET, and 1.0 µm PET) are packaged with the 96-well insert plate in a reservoir plate and includes the 96-well receiver plate with lid.
- The HTS Transwell-96 plates (3.0 and 5.0 µm PC, 8.0 µm PET) are packaged with the 96-well insert plate in the 96-well receiver plate with lid. Reservoir plates may be purchased separately.
- Sterile

Cat. No.	Description	Membrane Pore Size (µm)	Qty/ Pk	Qty/ Cs
3381	HTS Transwell-96 system, reservoir and receiver plates with 2 lids, PC	0.4	1	1
3391	HTS Transwell-96 system, reservoir and receiver plates with 2 lids, PC	0.4	1	5
7369	HTS Transwell-96 system reservoir and receiver plates with 2 lids, PET	0.4	5	5
3380	HTS Transwell-96 system, reservoir and receiver plates with 2 lids, PET	1.0	1	1
3392	HTS Transwell-96 system, reservoir and receiver plates with 2 lids, PET	1.0	1	5
3385	HTS Transwell-96 well plate, receiver plate and lid, individual, PC	3.0	1	2
3386	HTS Transwell-96 well plate, receiver plate and lid, bulk, PC	3.0	4	8
3387	HTS Transwell-96 well plate, receiver plate and lid, bulk, PC	5.0	4	8
3388	HTS Transwell-96 well plate, receiver plate and lid, individual, PC	5.0	1	2
3374	HTS Transwell-96 well plate, receiver plate and lid, individual, PET	8.0	1	2
3384	HTS Transwell-96 well plate, receiver plate and lid, bulk, PET	8.0	4	8
3382	HTS Transwell-96 receiver plate with lid, standard TC-treated	–	10	10
3383	HTS Transwell-96 reservoir plate media stabilizer and lid	–	10	10
3583	HTS Transwell-96 black receiver plate with lid, standard TC-treated	–	10	10
3783	HTS Transwell-96 white receiver plate and lid, standard TC-treated	–	10	10
7494	HTS Transwell-96 reservoir plate with media stabilizer and lid, Corning® CellBIND® surface treated	–	10	10

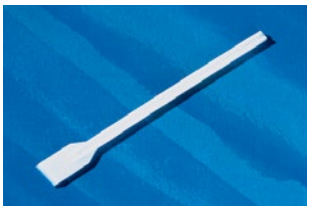
Culture Tubes

- Manufactured from optically clear polystyrene
- Threaded plug seal caps prevent leakage
- Tissue culture-treated tubes supplied racked
- Untreated tubes supplied bulk packed
- Sterile
- Nonpyrogenic

Cat. No.	Treated	Size (mm)	Cap Style	Qty/Pk	Qty/Cs
430157	No	16 x 125	Screw top	25	500
430172	Yes	16 x 125	Screw top	50	500

For Falcon® tubes, see the **Falcon Product Selection Guide** (Corning Lit. Code CLS-F-PSG-001).

Cell Scrapers and Lifters



Cell lifter (Cat. No. 3008)

Cell scraper, small (Cat. No. 3010)

- Useful for the manual harvesting of cells
- Blade design minimizes cell damage and ensures even contact with the growth surface.
- Cell lifter is useful for harvesting cells (especially stem cells) in dishes.
- Cell scrapers designed for use in flasks
- Individually wrapped
- Sterile
- Nonpyrogenic

Cat. No.	Description	Blade Length (cm)	Handle Length (cm)	Qty/Pk	Qty/Cs
3008	Cell lifter	1.9	18	1	100
3010	Cell scraper, small	1.8	25	1	100
3011	Cell scraper, large	3.0	39	1	100

For Falcon cell scrapers, see the **Falcon Product Selection Guide** (Corning Lit. Code CLS-F-PSG-001).

Cryogenic Vials and Accessories


External thread cryogenic vials

External Thread Cryogenic Vials

- Manufactured from polypropylene to withstand temperatures down to -196°C
- Black graduations with large white marking spot
- Vials have a silicone washer for a secure seal.
- Vials may be color-coded with inserts.
- Self-standing vials have a special base design, allowing them to be locked into cryogenic rack and tray (Cat. No. 431131) for single-handed manipulation.
- A foam rack is included with each case.
- RNase-/DNase-free
- Sterile
- Nonpyrogenic

Cat. No.	Capacity (mL)	Style	Self-Standing	Qty/Pk	Qty/Cs
430658	1.2	Conical bottom	Yes	50	500
430659	2.0	Round bottom	Yes	50	500
430661	2.0	Round bottom	No	50	500
8671	2.0	1D and 2D bar coded, round bottom	Yes	50	500
8676	2.0	1D bar coded, round bottom	Yes	50	500
430662	4.0	Round bottom	Yes	50	500
430663	5.0	Round bottom	Yes	50	500


Internal thread cryogenic vials

Internal Thread Cryogenic Vials

- Manufactured from polypropylene to withstand temperatures down to -196°C
- Black graduations with large marking spot
- Vials have a silicone washer for a secure seal.
- 2 mL self-standing vials are available in five cap colors.
- Vials may be color coded with inserts (see below).
- Self-standing vials have a special base design allowing them to be locked into cryogenic rack and tray (Cat. No. 431131) for single-handed manipulation.
- A foam rack is included with each case.
- RNase-/DNase-free
- Sterile
- Nonpyrogenic

Internal Thread Color Cap Cryogenic Vials

Cat. No.	Capacity (mL)	Cap Color	Style	Self-standing	Qty/Pk	Qty/Cs
431416	2.0	Assorted	Round bottom	Yes	50	500
431417	2.0	Yellow	Round bottom	Yes	50	500
431418	2.0	Blue	Round bottom	Yes	50	500
431419	2.0	Green	Round bottom	Yes	50	500
431420	2.0	Red	Round bottom	Yes	50	500
431421	2.0	White	Round bottom	Yes	50	500

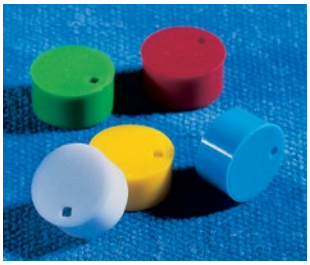
Cryogenic Vial Safety Tip

Appropriate safety equipment (gloves, face shields, biological safety cabinets, hoods, etc.) should always be used to protect personnel when removing vials or ampules from cryogenic storage systems.

Warning: Do not use cryogenic vials for storage in the liquid phase of liquid nitrogen. Only store vials in the vapor phase above the liquefied gas. Always use appropriate safety equipment when removing vials from cryogenic storage.

Internal thread color cap cryogenic vials

Bar coded cryogenic vials



Assorted colors of polypropylene cap inserts

Cryogenic vial racks

Internal Thread Orange Cap Cryogenic Vials

Cat. No.	Capacity (mL)	Style	Self-standing	Qty/Pk	Qty/Cs
430487	1.2	Conical bottom	Yes	50	500
430488	2.0	Round bottom	Yes	50	500
430489	2.0	Round bottom	No	50	500
431386	2.0	Round bottom	Yes	50	250
8670	2.0	1D and 2D bar coded, round bottom	Yes	50	500
8672	2.0	1D bar coded, round bottom	Yes	50	500
430490	4.0	Round bottom	No	50	500
430491	4.0	Round bottom	Yes	50	500
430492	5.0	Round bottom	No	50	500
430656	5.0	Round bottom	Yes	50	500

Warning! Do not use cryogenic vials for storage in the liquid phase of liquid nitrogen. Only store vials in the vapor phase above the liquefied gas. Always use appropriate safety equipment when removing vials from cryogenic storage.

Cap Inserts for Cryogenic Vials, Polypropylene

- Cap inserts provide color coding for easy sample identification.
- Cap inserts are packaged in resealable bags.
- Cap inserts fit all Corning® cryogenic vials.
- Nonsterile

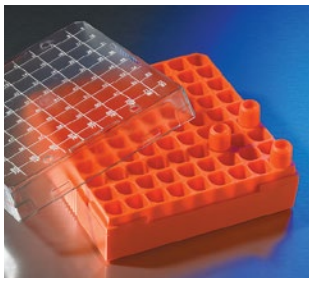
Cat. No.	Cap Color	Qty/Pk	Qty/Cs
430499	Assorted (100 each of white, blue, red, green, and yellow)	50	500
2015	White	50	500
2016	Blue	50	500
2017	Red	50	500
2018	Green	50	500
2019	Yellow	50	500

Cryogenic Vial Racks and Storage Boxes

- Reusable racks are designed for use with most cryogenic vials.
- Cat. No. 431131 has a locking feature for use with all Corning self-standing vials.

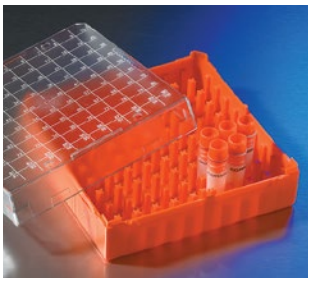
Cat. No.	Description	Qty/Pk	Qty/Cs
431131	Reusable orange polypropylene vial rack, holds 50 vials, self-locking design	2	2
431119	81 count (9 x 9 array) cryogenic storage box, for 1 to 2 mL vials	5	10
431120	81 count (9 x 9 array) cryogenic storage box, for 4 to 5 mL vials	5	10
431121*	100 count (10 x 10 array) cryogenic box, for 1 to 2 mL vials	5	10
8673	Cryogenic storage box, polycarbonate, holds 81 vials, designed to fit Corning 2D bar coded cryogenic vials	5	10
8674	Cryogenic storage box, polycarbonate, holds 100 vials, designed to fit Corning 2D bar coded cryogenic vials	5	10

*431121 accepts internally threaded cryogenic vials only.



Cryogenic storage box (Cat. No. 431119)

Cryogenic storage box (Cat. No. 431120)



Cryogenic storage box (Cat. No. 431121)

Cell Culture Filtration

150 mL Tube Top Vacuum Filters

- 42 mm square membrane
- Minimizes unnecessary transfers by filtering directly into a 50 mL centrifuge tube
- Includes two centrifuge tube stands with each case
- Each polypropylene centrifuge tube is supplied with an individually wrapped cap for storage.
- Individually packaged, sterile, nonpyrogenic

Cat. No.	Membrane	Funnel Size/Tube Size (mL)	Pore Size (µm)	Qty/Cs
430314	CA	150/50	0.45	12
430320	CA	150/50	0.22	12

CA = cellulose acetate.

Vacuum Filtration Systems

- Four sizes: 150 mL, 250 mL, 500 mL, and 1L
- Filters feature printing on the funnel for easy product identification.
- Angled hose connector simplifies vacuum line attachment.
- Receiver bottles feature easy grip sides for improved handling.
- Individually packaged, sterile, nonpyrogenic
- Caps for receiver bottles are sterile and individually packaged.
- Extra plastic storage bottles are available, see page 24.
- Prefilters not included

150 mL Capacity, 42 mm Square Membrane

Cat. No.	Membrane	Funnel/Bottle Volume (mL)	Pore Size (µm)	Qty/Cs
431153	PES	150/150	0.22	12
431154	CA	150/150	0.22	12
431155	CA	150/150	0.45	12
250 mL Capacity, 49.5 mm Square Membrane				
430756	CN	250/250	0.22	12
430767	CA	250/250	0.22	12
430768	CA	250/250	0.45	12
430771	NY	250/250	0.2	12
431096	PES	250/250	0.22	12
500 mL Capacity, 63 mm Square Membrane				
430758	CN	500/500	0.22	12
430769	CA	500/500	0.22	12
430770	CA	500/500	0.45	12
430773	NY	500/500	0.2	12
431097	PES	500/500	0.22	12
431475	PES	500/500	0.1	12
1,000 mL Capacity, 79 mm Square Membrane				
430186	CN	1,000/1,000	0.22	12
430515	NY	1,000/1,000	0.2	12
430516	CA	1,000/1,000	0.45	12
430517	CA	1,000/1,000	0.22	12
431098	PES	1,000/1,000	0.22	12
431205*	CA	500/1,000	0.22	12
431206*	CA	500/1,000	0.45	12
431474	PES	1,000/1,000	0.1	12

*500 mL funnel with 63 mm membrane.
PES = polyethersulfone, CA = cellulose acetate, CN = cellulose nitrate, NY = nylon.

Bottle Top Vacuum Filters

- Individually packaged, sterile and nonpyrogenic
- Available in 33 mm and 45 mm neck sizes to fit most glass and plastic media storage bottles
- 45 mm neck sizes fit on Corning® plastic storage bottles (see below).

150 mL Capacity, 42 mm Square Membrane

Cat. No.	Membrane	Volume (mL)	Neck Size (mm)	Pore Size (µm)	Qty/Cs
430624	CA	150	33	0.22	48
430625	CA	150	33	0.45	48
430626	CA	150	45	0.22	48
430627	CA	150	45	0.45	48
431160	PES	150	33	0.22	48
431161	PES	150	45	0.22	48

500 mL Capacity, 63 mm Square Membrane

430049	NY	500	45	0.2	12
430512	CA	500	33	0.45	12
430513	CA	500	45	0.22	12
430514	CA	500	45	0.45	12
430521	CA	500	33	0.22	12
431117	PES	500	33	0.22	12
431118	PES	500	45	0.22	12

1,000 mL Capacity, 79 mm Square Membrane

430015	CA	1,000	45	0.22	12
431174	PES	1,000	45	0.22	12

PES = polyethersulfone, CA = cellulose acetate, CN = cellulose nitrate, NY = nylon.

Polystyrene Storage Bottles

- Disposable polystyrene bottles for storage of media, buffers and other aqueous solutions
- Two styles:
  - Low profile, easy grip style has sides that facilitate handling
  - Traditional style has smooth sides
- Plug seal caps (45 mm) provide an airtight seal
- Bottles can be used with Corning vacuum filtration systems (see page 23).
- Sterile
- Nonpyrogenic

Corning Easy Grip Style Storage Bottles

Cat. No.	Volume (mL)	Neck Size (mm)	Qty/Pk	Qty/Cs
431175	150	45	2	24
430281	250	45	2	24
430282	500	45	2	24
430518	1,000	45	2	24

Costar® Traditional Style Storage Bottles

8388	125	45	1	24
8390	250	45	1	12
8393	500	45	1	12
8396	1,000	45	1	12

Syringe Filters

- A variety of membranes are available to meet your needs: polyethersulfone (PES) – low protein binding and faster flow rates; surfactant-free cellulose acetate (SFCA) – lowest protein binding; polytetrafluorethylene (PTFE) – chemical resistance; regenerated cellulose (RC) – best choice for DMSO compatibility; nylon (NY) – hydrophilic, surfactant-free and lowest extractable.
- 100% integrity tested, nonpyrogenic, noncytotoxic, and manufactured in accordance with ISO 9002 standards

Cat. No.	Diameter (mm)	Pore Size (µm)	Membrane Material	Housing Material	Sterile	Inlet/ Outlet	Packaging	Qty/Cs
431212	4	0.2	RC	PP	Yes	LL/LS	Ind	50
431215	15	0.2	RC	PP	Yes	LL/LS	Ind	50
431218	28	0.2	SFCA-PF	AC	Yes	LL/LS	Ind	50
431219	28	0.2	SFCA	AC	Yes	LL/LS	Ind	50
431220	28	0.45	SFCA	AC	Yes	LL/LS	Ind	50
431221	28	0.8	SFCA	AC	Yes	LL/LS	Ind	50
431222	25	0.2	RC	PP	Yes	LL/LS	Ind	50
431224	25	0.2	NY	PP	Yes	LL/LS	Ind	50
431225	25	0.45	NY	PP	Yes	LL/LS	Ind	50
431227*	50	0.2	PTFE	PP	Yes	HB/HB	Ind	12
431229	28	0.2	PES	AC	Yes	LL/LS	Ind	50
431231	25	0.45	PTFE	PP	No	LL/LS	Bulk	50

PP = polypropylene, AC = acrylic copolymer, LL = Luer lock/female, LS = Luer slip/male, HB = hose barb, NY = nylon, PES = polyethersulfone, PTFE = polytetrafluorethylene, RC = regenerated cellulose, SFCA = surfactant-free cellulose acetate, SFCA-PF = surfactant-free cellulose acetate with prefilter.

*Recommended as in-line air filter.

Technical Appendix

Corning® Cell Culture Surfaces

Introduction

Corning currently offers six polystyrene-based surfaces (Table 1) for growing cells, including the Corning CellBIND® surface.

Most of these early plastic vessels were made from polystyrene, a long carbon chain polymer with benzene rings attached to every other carbon. Polystyrene was chosen because it has excellent optical clarity, is easy to mold and is relatively inexpensive. However, it also has one significant drawback: it is a very hydrophobic (non-wettable) polymer to which cells have difficulty attaching. Fortunately, the surface of polystyrene can be easily modified by a variety of chemical (sulfuric acid) and physical (corona discharge, gas-plasma, or irradiation) methods. Using these methods, hydroxyl, ketone, aldehyde, carboxyl, and amine groups can readily be grafted onto the polymer (Figure 1). These groups modify the surface characteristics changing the uncharged hydrophobic surface into a more ionic hydrophilic surface. Polystyrene can also be modified through chemical reactions to allow the covalent attachment of a variety of reactive groups that can be used for the subsequent covalent immobilization of biomolecules. For additional information, please check the technical section of our website.

Corning CellBIND Surface

The Corning CellBIND surface is designed to improve cell attachment under difficult conditions, such as reduced-serum or serum-free medium, resulting in higher cell yields. It is also useful for growing "difficult" cells such as primary cultures or transfected cells over expressing proteins. Developed by Corning scientists, this technology uses a novel microwave plasma process for treating the culture surface. This process improves cell attachment by incorporating significantly more oxygen into the cell culture surface than traditional plasma or corona discharge treatments, rendering it more hydrophilic (wettable) and increasing the stability of the surface.

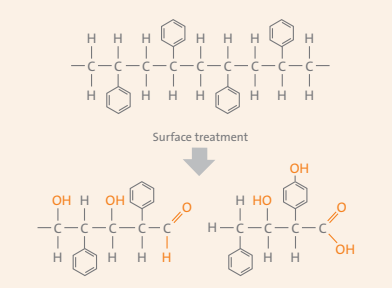


Figure 1. Polystyrene can be surface-modified by the addition of a variety of different chemical groups, by breaking the carbon chain backbone, or by opening the benzene ring (not shown).

Unlike biological coatings, the Corning CellBIND surface is a nonbiological surface that requires no special handling or storage. Because the polymer is treated, rather than coated, the surface is more consistent and stable.

Corning CellBIND surface benefits:

- Quickly adapts cells to reduced-serum or serum-free conditions
- May eliminate the need for tedious, time-consuming, expensive, and low stability biological coatings
- Stable at room temperature, requires no refrigeration, or special handling
- Gives more consistent and even cell attachment for difficult to attach cell lines, especially transfected cells
- Reduces premature cell detachment from confluent cultures especially in roller bottles and during cell-based assays

The Corning CellBIND surface is available on flasks, multiple well plates, Corning CellSTACK® culture chambers, roller bottles, 96-well microplates, 384-well microplates, and dishes.

Corning Synthemax™ Self-coating Substrate

The Corning Synthemax II-SC Substrate is a peptide-copolymer powder that readily dissolves in water, for use as a cell adhesion promoting surface coating for various stem cell lines. Corning Synthemax II-SC Substrate can be coated onto any culture vessel format providing additional flexibility to end users.

Table 1. Corning Cell Culture Surfaces

Corning Surface	Binding Interaction	Sample Properties
Corning CellBIND surface-modified polystyrene	Hydrophilic and ionic (negatively charged)	Improves cell attachment and binding to polystyrene
Standard tissue culture-treated polystyrene	Hydrophilic and ionic (negatively charged)	Allows cell attachment and binding to polystyrene
Untreated polystyrene	Hydrophobic	Significantly reduces the attachment of most cells
Ultra-Low Attachment-coated polystyrene	Hydrophilic and non-ionic	Hydrogel layer prevents the attachment of almost all cells
Poly-D-Lysine-coated polystyrene	Hydrophilic and ionic (positively charged)	Improves cell attachment and binding to polystyrene
Corning Synthemax II-SC substrate	Synthetic peptide surface coating	Mimics cells' natural environment with extracellular matrix-derived cell adhesion promoting peptide
Corning Osteo Assay surface	Crystalline calcium phosphate coating	Mimics *in vivo* bone-like surface for *in vitro* bone cell assays

Corning® Osteo Assay Surface

The Corning Osteo Assay surface is an inorganic crystalline calcium phosphate coating on a polystyrene plate designed to mimic *in vivo* bone environment. The surface is intended to facilitate a variety of bone cell assays including immunofluorescent staining, tartrate resistant acid phosphatase (TRAP), and surface resorption assays for osteoclasts. The surface is available in a convenient, ready-to-use, sterile, multiple well plate, 1 x 8 Corning Stripwell™ microplate, and is stable at room temperature.

The Osteo Assay surface is useful for:

- Cell growth and differentiation of precursor cells to osteoclast or blast
- Direct readout of osteoclast and osteoblast cell function and differentiation assays such as TRAP staining, pit resorption, and bone nodule formation
- Targeted drug screening for bone cell activity
- Real time imaging for high content analysis
- Quantitative assay for enzymatic activity by sampling the cell culture supernatant
- Ideal for bone and metastatic cells co-cultures (Figure 2)

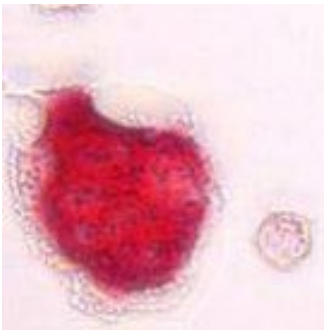


Figure 2. Corning Osteo Assay surface promotes co-culture of metastatic breast cancer cell line, MDA MB231 (small light pink stained cells) and multi-nucleated osteoclast (dark pink)

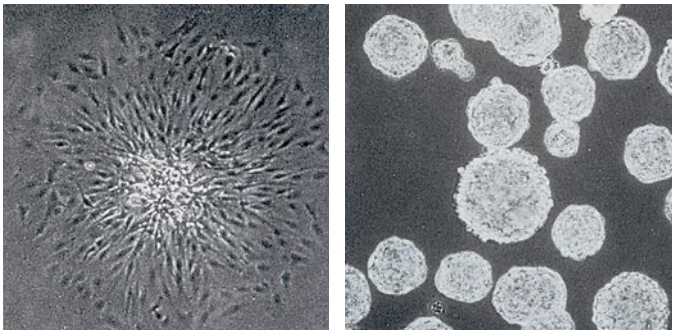


Figure 3. Single-cell-derived colonies of C6 glioma cells grow as flattened attached colonies in standard tissue culture-treated surface (left panel) but form unattached spherical colonies on the Ultra-Low Attachment surface (right panel).

Corning Ultra-Low Attachment-coated Polystyrene Surface

The Ultra-Low Attachment surface is a covalently bound hydrogel layer that is hydrophilic and neutrally charged. Since proteins and other biomolecules passively adsorb to polystyrene surfaces through either hydrophobic or ionic interactions, this hydrogel surface naturally inhibits nonspecific immobilization via these forces, thus inhibiting subsequent cell attachment. This surface is very stable, noncytotoxic, biologically inert, and nondegradable. Corning offers the Ultra-Low Attachment surface on dishes, plates, flasks, and Corning CellSTACK® culture chamber 1-stack.

This Ultra-Low Attachment surface has been shown to successfully inhibit attachment of anchorage dependent MDCK, Vero, and C6 cells grown for a period of time equal to that necessary to obtain confluent cell growth on the control surface (standard tissue culture-treated polystyrene (Figure 3). This surface has also been shown to inhibit the attachment and activation of macrophages and neutrophils.

Ultra-Low Attachment surface culture vessels are useful for:

- Studying tissue-specific functions of certain cancer cells (i.e., MCF-7 breast cancer cells)
- Preventing stem cells from attachment-mediated differentiation
- Selectively culturing tumor or virally transformed cells as unattached colonies (substitute for soft agar assays)

Poly-D-Lysine-coated Surface

Some assays and procedures require enhanced binding of cells to polystyrene. Corning Poly-D-Lysine (PDL) microplates are coated with PDL (molecular weight range of 70 kDa to 150 kDa) by a proprietary method. This synthetic polymeric coating creates a uniform net positive charge on the plastic surface which, for some cell types, can enhance cell attachment, growth, and differentiation, especially in serum-free and low serum conditions. PDL surfaces often improve attachment and growth of primary neurons, glial cells, neuroblastomas, and a variety of transfected cell lines, including HEK-293. Corning offers Poly-D-Lysine-coated 96-well and 384-well microplates

Standard Tissue Culture-treated Polystyrene Surface

Standard Corning polystyrene cell culture vessels are surface modified using either corona discharge (flasks, dishes, and microplates) or gas-plasma (roller bottles and culture tubes). These processes generate highly energetic oxygen ions which graft onto the surface polystyrene chains (Figure 1) so that the surface becomes hydrophilic and negatively charged when placed in medium. Corning offers the standard tissue culture-treated surface on flasks, dishes, multiple well plates, CellSTACK culture chambers, roller bottles, and culture tubes.

Untreated Polystyrene Surface

Natural, unmodified polystyrene surfaces are hydrophobic and only bind cells and biomolecules through passive hydrophobic interactions. Corning offers untreated polystyrene culture dishes and microplates for growing cells in stationary suspension or other applications where reduced cell attachment is desired. However, these untreated vessels are sterilized by low-dose gamma irradiation, which slightly increases the wettability of the surface. Since some transformed cell lines (CHO-K1, for example) and macrophages will attach and grow on these hydrophobic surfaces, Corning also offers an Ultra-Low Attachment surface for use in situations where cell attachment must be kept to an absolute minimum.

Characteristics of Corning® Plasticware

Portions of this table courtesy of Modern Plastics Encyclopedia. Most data are from tests by A.S.T.M. methods. Tables show averages or ranges. Many properties vary with manufacturer, formulation, testing laboratory, and the specific operating conditions.

	Polystyrene	Polyethylene (High Density)	Polypropylene	Polycarbonate	Nylon	Polytetra-fluorethylene (PTFE)	Polyethylene Terephthalate (PET)
Physical Characteristics							
Basic Properties	Biologically inert, hard, excellent optical qualities	Biologically inert, high chemical resistance	Biologically inert, high chemical resistance, exceptional toughness	Clear, very tough, inert, high temperature resistance	Tough, heat resistant, machinable, high moisture vapor transmission	Biologically and chemically inert, high resistant slippery surface	Biologically inert, hard, tough, excellent optical qualities
Clarity	Clear	Opaque	Translucent	Clear	Opaque	Opaque	Clear
Autoclave Results	Melts	May distort	Withstands several cycles	Withstands one cycle	OK	OK	Melts
Heat Distortion Point	147°F - 175°F 64°C - 80°C	250°F 121°C	275°F 135°C	280°F - 290°F 138°C - 143°C	300°F - 356°F 150°C - 180°C	250°F 121°C	158°F 70°C
Burning Rate	Slow	Slow	Slow	Self-extinguishing	Self-extinguishing	None	–
Effects of Laboratory Reagents							
Weak Acids	None	None	None	None	None	None	None
Strong Acids	Oxidizing acids attack	Oxidizing acids attack	Oxidizing acids attack	May be attacked	Attacked	None	Oxidizing acids attack
Weak Alkalies	None	None	None	None	None	None	None
Strong Alkalies	None	None	None	Slowly attacked	None	None	Attacked
Organic Solvents	Soluble in aromatic chlorinated hydrocarbons	Resistant below 80°C	Resistant below 80°C	Soluble in chlorinated hydrocarbons; partly soluble in aromatics	Resistant	Resistant	Soluble in aromatic or chlorinated hydrocarbons
Gas Permeability of Thin Wall Products*							
O_2	Low	High	High	Very low	Very low	–	Very low
N_2	Very low	Low	Low	Very low	Very low	–	Very low
CO_2	High	Very high	Very high	Low	–	–	Low

*Obtained from a table which lists gas permeability in CC/100 sq. inches per 24 hr./mil.

Selecting the Best Filter for Your Application

Choosing a filter does not have to be complicated – Corning has simplified the process. Just follow these four easy steps:

Step 1: Match your application with the best pore size.

Step 2: Select the best membrane and housing material for your application.

Step 3: Select the correct membrane area to optimize flow rate and throughput.

Step 4: Choose the best filter design for your application.

Step 1: Match your application with the best pore size.

The pore size is usually determined by your application or objective. Mycoplasma removal can be performed using a 0.1 µm pore filter. Routine laboratory sterilization of most media, buffers, biological fluids, and gases is usually done with 0.2 or 0.22 µm pore filter membranes. Clarification and prefiltration of solutions and solvents is best accomplished with 0.45 µm or larger filter membranes. Prefiltration to improve filter performance can also be accomplished by the use of glass fiber prefilters that can be purchased separately. Use Table 1 to match your applications with a recommended membrane and pore size.

Table 1. Selecting the Pore Size

Application	Pore Size (µm)	Membrane Availability
Removing mycoplasma from solutions	0.1	Only PES
Sterilization of aqueous solutions	0.2 to 0.22	All membranes except PTFE
Ultracleaning of solvents (HPLC)	0.2 to 0.22	RC, Nylon, PTFE
Clarification of aqueous solutions	0.45	All membranes except PTFE
Clarification of solvents (HPLC)	0.45	RC, Nylon, PTFE
Course particle removal	0.8	SFCA

PES = polyethersulfone, SFCA = surfactant-free cellulose acetate, PTFE = polytetrafluorethylene, RC = regenerated cellulose.

Step 2: Select the best membrane and housing material for your application.

Corning Filter Membranes

Your filter unit must be fully compatible with the chemical characteristics of your sample. Some filter membranes contain nontoxic wetting agents that may interfere with some applications. Other membranes may bind proteins or other macromolecules leading to premature filter clogging or loss of valuable samples. Therefore, it is very important to understand their characteristics and the potential effects filter membranes can have on the solutions they contact.

The information from Tables 2 and 3 will help you choose the best Corning® filter membranes for your applications.

Table 2. Characteristics of Corning Filter Membranes

	Cellulose Nitrate	Cellulose Acetate	Nylon	Polyether-sulfone	Regenerated cellulose	PTFE
Wetting Agents	Yes	Yes	No, naturally hydrophilic	No	Yes	Does not wet
Protein Binding	Very high	Very low	Low to moderate	Very low	Low	N/A
DNA Binding	High	Very low	Very high	Very low	Low	N/A
Chemical Resistance	Low	Low	Moderate to high	Low	Very high	Very high

PTFE = polytetrafluorethylene.

Cellulose acetate (CA) membranes have a very low binding affinity for most macromolecules and are especially recommended for applications requiring low protein binding, such as filtering culture media containing sera. However, both cellulose acetate and cellulose nitrate membranes are naturally hydrophobic and have small amounts (less than 1%) of nontoxic wetting agents added during manufacture to ensure proper wetting of the membrane. If desired, these agents can be easily removed prior to use by filtering a small amount of warm purified water through the membrane or filter unit. Surfactant-free cellulose acetate membranes with very low levels of extractables are available on some Corning® syringe filters.

Cellulose nitrate (CN) membranes are recommended for filtering solutions where protein binding is not a concern. They are recommended for use in general laboratory applications such as buffer filtration. Corning's cellulose nitrate membranes are Triton® X-100-free and noncytotoxic.

Nylon membranes are naturally hydrophilic and are recommended for applications requiring very low extractables since they do not contain any wetting agents, detergents, or surfactants. Their greater chemical resistance makes them better for filtering more aggressive solutions, such as alcohols and DMSO. However, like cellulose nitrate membranes, they may bind greater amounts of proteins and other macromolecules than do the cellulose acetate or PES membranes. They are recommended for filtering protein-free culture media.

Polyethersulfone (PES) membranes are highly recommended for filtering cell culture media. PES has both very low protein binding and extractables. PES also demonstrates faster flow rates than cellulosic or nylon membranes.

Regenerated cellulose (RC) membranes are hydrophilic and have very good chemical resistance to solvents, including DMSO. They are used to ultra-clean and de-gas solvents and mobile phases used in HPLC applications.

Polytetrafluorethylene (PTFE) membranes are naturally and permanently hydrophobic. They are ideal for filtering gases, including humidified air. The extreme chemical resistance of PTFE membranes makes them very useful for filtering solvents or other aggressive chemicals for which other membranes are unsuitable. Because of their hydrophobicity, PTFE membranes must be prewetted with a solvent, such as ethanol, before aqueous solutions can be filtered.

Glass fiber filters are used as a depth filter for prefiltration of solutions. They have very high particle loading capacity and are ideal for prefiltering dirty solutions and difficult-to-filter biological fluids, such as sera.

Corning Filter Housing Materials

The filter housing materials, as well as the filter membrane, must be compatible with the solutions being filtered.

Polystyrene (PS) is used in the filter funnels and storage bottles for all of the Corning plastic vacuum filters. This plastic polymer should only be used in filtering and storing nonaggressive aqueous solutions and biological fluids. Refer to Table 3 for more chemical compatibility information.

Acrylic copolymer (AC) and **Polyvinyl chloride (PVC)** are used in some of the Corning syringe filter housings. These plastics should only be used in filtering nonaggressive aqueous solutions and biological fluids. Refer to Table 3 for more chemical compatibility information.

Polypropylene (PP) is used in the Spin-X® centrifuge filters and some of the syringe and disc filter housings. This plastic polymer has very good resistance to many solvents, refer to Table 3 for more chemical compatibility information.

Chemical Compatibility

The mechanical strength, color, appearance, and dimensional stability of Corning® filters are affected to varying degrees by the chemicals with which they come into contact. Specific operating conditions, especially temperature and length of exposure, will also affect their chemical resistance. Table 3 provides a general guideline for the chemical resistance of Corning filter membranes and housings.

Table 3. Chemical Resistance Guide for Corning Filters*

	Filter Membranes						Housing Materials		
Chemical Class	**CN**	**CA**	**NY**	**PES**	**RC**	**PTFE**	**PS**	**PP**	**AC**
Weak Acids	2	2	2	3	1	1	1	1	2
Strong Acids	3	2	3	3	3	1	2	1	3
Alcohols	3	1	1	1	1	1	2	1	3
Aldehydes	2	3	2	3	2	1	3	1	3
Aliphatic Amines	3	3	1	1	1	1	3	1	3
Aromatic Amines	3	3	2	3	1	1	3	1	3
Bases	3	3	2	3	2	1	1	1	2
Esters	3	3	1	3	1	1	3	2	2
Hydrocarbons	2	2	2	3	1	1	3	2	2
Ketones	3	3	2	3	1	1	3	2	3

1 = Recommended; 2 = May be suitable for some applications, a trial run is recommended; 3 = Not recommended; CN = cellulose nitrate; CA = cellulose acetate; NY = nylon; PES = polyethersulfone; RC = regenerated cellulose; PS = polystyrene; PTFE = polytetrafluorethylene; PP = polypropylene; PVC = polyvinylchlorides; AC = acrylic copolymer.

*This information has been developed from a combination of laboratory tests, technical publications, or material suppliers. It is believed to be reliable. Due to conditions outside of Corning's control, such as variability in temperatures, concentrations, duration of exposure and storage conditions, no warranty is given or is to be implied with respect to this information.

Step 3: Select the correct membrane area to optimize flow rate and throughput.

The third step is selecting a filter that will have enough volume capacity or throughput to process your entire sample quickly and efficiently. This is primarily determined by the effective surface area of the membrane. Table 4 shows the relationship between filter size, effective filtration surface area, and expected throughput volumes. The lower values are typical of viscous or particle-laden solutions; the higher values are typical of buffers or serum-free medium.

Table 4. Typical Expected Throughput Volumes

Filter Design and Dimensions	Effective Filter Area (cm^2)	Expected Throughput (mL)*
4 mm diameter syringe/disc	0.07	0.05 - 3
15 mm diameter syringe/disc	1.7	3 - 15
25 mm diameter syringe/disc	4.8	10 - 50
26 mm diameter syringe/disc	5.3	10 - 50
28 mm diameter syringe/disc	6.2	10 - 50
50 mm diameter disc	19.6	100 - 500
150 mL filter funnel (42 x 42 mm)	13.6	100 - 500
250 mL filter funnel (49.5 x 49.5 mm)	19.6	200 - 750
500 mL filter funnel (63 x 63 mm)	33.2	300 - 1,500
1000 mL filter funnel (79 x 79 mm)	54.5	500 - 3,000

*These values assume an aqueous solution and a 0.2 µm membrane. Solutions containing sera or other proteinaceous materials will be at the lower end of the range. Use of pre-filters with filter funnels may extend the throughput 50% to 100% above the values shown.

Step 4: Choose the best filter design for your application.

Corning offers three basic filter types: positive pressure-driven syringe and disc filters, Spin-X® centrifuge tube filters driven by centrifugation, and vacuum-driven filters. The vacuum-driven filters offer several different designs and styles in disposable plastic products.

Syringe/Disc Filters

Corning syringe filters

The smaller conventional **Corning® syringe disc-type filters** (4, 15, 25, 26, and 28 mm diameter) are used with syringes which serves as both the fluid reservoir and the pressure source. They are 100% integrity tested. The HPLC-certified nonsterile syringe filters are available with nylon, regenerated cellulose or polytetrafluorethylene (PTFE) membranes in polypropylene housing for extra chemical resistance. The sterile tissue culture tested syringe filters are available in PES, regenerated cellulose (ideal for use with DMSO-containing solutions), or surfactant-free cellulose acetate membranes in either polypropylene or acrylic copolymer housings.

The larger **50 mm diameter disc filter** has a PTFE membrane and polypropylene housing with hose barb connectors. This product is ideal for filtering aggressive solvents or gases and applications requiring sterile venting of gases. Because they have a hydrophobic (will not pass aqueous solutions) membrane, they are also ideal for protecting vacuum lines and pumps.

Corning Disposable Plastic Vacuum Filters


Corning filter/storage systems

These sterile filters are available in three styles: complete filter/storage systems, bottle top filters, and centrifuge tube top filters. Corning filters feature printed funnels that identify membrane type and product number for easy product identification. Angled hose connectors simplify vacuum line attachment. Four membranes are available to meet all of your filtration needs: cellulose acetate, cellulose nitrate, nylon, or polyethersulfone.

Corning filter/storage systems consist of a polystyrene filter funnel joined by an adapter ring to a removable polystyrene storage bottle with a separate sterile polyethylene cap. Receiver bottles feature easy grip sides for improved handling. Additional Corning polystyrene receiver/storage bottles can be ordered separately to increase throughput.

Corning bottle top filters have the same polystyrene filter funnel designs and capacities as the filter systems, but the adapter ring is designed for threading onto a glass bottle supplied by the user. Select either the 33 mm thread design for standard narrow glass mouth media bottles or the 45 mm design for bottles larger than 2 liter capacity. See Safety Precautions for recommendations on using these products with glass bottles (page 34).


Corning Spin-X centrifuge tube filters

150 mL centrifuge tube top filters feature a 150 mL polystyrene filter funnel with a 50 mm diameter cellulose acetate membrane attached to a 50 mL polypropylene centrifuge tube to minimize unnecessary transfers by filtering directly into centrifuge tube.

Spin-X Centrifuge Tube Filters

Spin-X centrifuge tube filters consist of a membrane-containing (either cellulose acetate or nylon) filter unit within a polypropylene centrifuge tube. They filter small sample volumes by centrifugation for bacteria removal, particle removal, HPLC sample preparation, removal of cells from media, and purification of DNA from agarose and polyacrylamide gels.

Improving Filter Performance

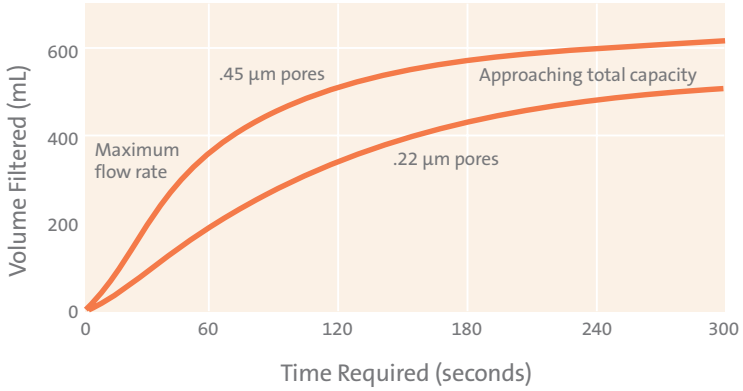
Getting the best performance from your filtration products requires two very important steps: selecting the right products for the job, and then using these products effectively. The first part of this filtration section covered the steps required to select the right filter for your applications; this section will help you optimize the filtration process by keying on the two most important areas – maximizing filter flow rate and throughput or capacity.

The flow rate and throughput of filters are dependent on many variables. Some variables, such as temperature, pressure, and especially, the characteristics of the sample, require special attention.

Effect of Pore Size

The pore size of filter membranes is usually dictated by the requirements of the filter application rather than the desired flow rate. Larger pore membranes usually have both faster flow rates and greater capacity before pore clogging slows the flow. Figure 2 indicates the effect of pore size on filter performance. As expected, the initial flow rate (steep part of the curve) of the .45 µm filter was approximately twice that of the .22 µm filter, although its capacity or throughput prior to clogging (the area at the plateau) was only about 20% greater.

Figure 2. Effect of Pore Size on Performance



Test Conditions: Medium containing 10% fetal bovine serum was filtered using cellulose acetate membranes at 23°C and 600 mm Hg vacuum.

Table 5. Corning Filter Designs

Design	Sterile	Filter Diameters/ Dimensions (mm)	Available Membrane Materials	Pore Sizes (µm)	Special Features
Syringe Filters	Some	4, 15, 25, 26 and 28	RC, PES, SFCA, NY and PTFE	0.2. 0.45, and 0.8	Ideal for small volume pressure filtration
Disc Filters	Yes	50	PTFE	0.2	Ideal for filtering solvents and gases
Vacuum Filter Systems*	Yes	42, 49.5, 63, 79	PES, CA, CN and Nylon	0.2 (NY only), 0.22 (PES, CN), and 0.45 (CA only)	Easy grip bottles for storing filtrate
Bottle Top Vacuum Filters*	Yes	42, 63, 79	PES, CA, CN and Nylon	0.2 (NY only), 0.22 (PES, CA, CN), and 0.45 (CA only)	Two neck widths to fit most glass bottles
Tube Top Vacuum Filters*	Yes	42	CA	0.22 and 0.45	Minimizes unnecessary transfers by filtering into a 50 mL centrifuge tube
Spin-X® Centrifuge Filters	Some	7.7	CA and Nylon	0.22 and 0.45	Ideal for purifying DNA from agarose gels

CN = cellulose nitrate; CA = cellulose acetate; PES = polyethersulfone; RC = regenerated cellulose; PTFE = polytetrafluorethylene.
*Vacuum filter systems, bottle top vacuum filters, and tube top vacuum filters have a square membrane.

Effect of Membrane Area

The easiest and most practical way to increase filter flow rate is to increase the effective surface area of the filter membrane. Corning offers both syringe and vacuum filter units with a choice of membrane diameters that give a wide range of flow rates and throughputs (See Table 4).

Effect of Fluid Temperature

For most applications, filtering solutions at room temperature is fine. Usually increasing the temperature of a solution will increase the flow rate. For example, increasing the temperature of cell culture medium from 4°C to 37°C resulted in a doubling of the flow rate. This is most likely due to a decrease in the viscosity of the medium. In some cases, however, filtration at lower temperatures may increase the overall throughput, especially with protein and lipid-containing solutions such as serum.

Effect of Pressure Differential

For vacuum-driven filtration, a pressure differential (vacuum) of 400 mm Hg (7.73 psig) is recommended. Increasing the pressure differential further will slightly increase the flow rate, but it may also result in excess foaming as the gases in the filtrate come out of solution as bubbles. This is especially a problem with filtering bicarbonate-buffered cell culture media. The dissolved carbon dioxide in the medium will evolve quickly at higher-pressure differentials leading to a rise in pH and excessive foaming if serum proteins are present.

Effect of Prefiltration

A simple way to improve filter performance is to pretreat your solution. High speed centrifugation will remove most suspended particles and reduce filter clogging, extending both flow rate and throughput (Corning® 250 and 500 mL centrifuge bottles are ideal for centrifuging larger liquid volumes). Prefiltration through a glass fiber pad or depth filter will also reduce particle load and premature membrane clogging. The use of a glass fiber prefilter has been demonstrated to more than double the throughput when filtering calf serum. These glass fiber prefilters are available for all Corning vacuum filter systems and bottle top filters. For particularly difficult to filter solutions, it may be helpful to first prefilter the solution through a larger pore membrane filter.

Safety Precautions

Corning filter units are intended for use by persons knowledgeable in safe laboratory practices. Safety is one of the most critical concerns of any lab. Because of variations in conditions, Corning cannot guarantee any glassware or plasticware against breakage under vacuum or pressure. Failure can result from surface damage, improper pressure or temperature, or use with incompatible chemicals. Adequate precautions should always be taken to protect personnel doing such work. To help improve lab safety, Corning has compiled these common-sense suggestions concerning the safe use of filtration products:

- Use of vacuum-driven filters on glass or plastic bottles may cause personal injury if they implode during use. Eye protection is strongly recommended whenever glass or plastic vessels are used under partial vacuum negative pressure to guard against these injuries. Only bottles specifically designed for these applications should be used.
- Always use cylindrical bottles.
- Never use the 45 mm threaded bottle top filters on glass media bottles larger than 2 liter capacity. Use of bottle top filters with glass media bottles (with plastic safety coatings) is highly recommended for vacuum filtration.
- Never use a square bottle for vacuum applications.
- Never use the 33 mm threaded bottle top filters on a glass media bottle that is larger than 500 mL.
- Never use plastic roller bottles as substitute receiver bottles during vacuum filtration.
- Do not use a bottle for vacuum applications if it is not designed to withstand a vacuum; if the bottle is scratched, chipped or cracked; if the bottle is clamped in such a way as to induce stress; or if the bottle is being hand held.
- Care must be taken when using syringe filters with small syringes (5 mL or less) as the pressures generated may exceed the 75 psi limit, causing a possible membrane or housing failure. Loss of valuable contents and personal injury may result. If clogging causes slower flow rates, we recommend that you replace filters rather than increase the pressure.

Catalog Number Index

For more specific information on claims, visit www.corning.com/certificates.

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