



Cell Culture

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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. All Corning Life Sciences plastics manufacturing facilities are ISO 9002 registered. ISO registration is recognized worldwide as a standard of excellence for quality systems.

In addition, customers can now request a Certificate of Quality for any Corning® or Costar® cell culture product. This certificate details lot-specific information on component materials, sterility testing, pyrogen testing, cell attachment, and growth characteristics.

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 and Costar cell culture products are certified nonpyrogenic with a documented endotoxin level of equal to or less than 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 web site www.corning.com/lifesciences.

Lot Number Traceability

To ensure accurate lot number traceability in biotechnology research and production facilities, all Corning and Costar 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 and Costar cell culture products are produced in FDA-registered 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.

Cell Culture Flasks

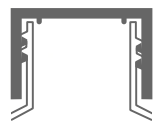
Corning® and Costar® flasks are available in a variety of sizes, designs and cap styles to meet your needs.

- ▶ Manufactured from optically clear virgin polystyrene
- ▶ Treated for optimal cell attachment
- ▶ Printed with lot numbers for ease in traceability
- ▶ 100% integrity tested
- ▶ Sterilized by gamma irradiation
- ▶ Certified nonpyrogenic

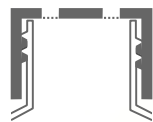
Flask Cap Styles



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 nonwetable membrane sealed to the cap, providing consistent, sterile gas exchange while minimizing the risk of contamination. These caps are highly recommended for use in all CO₂ 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.



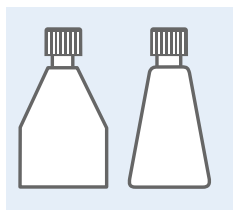
Canted neck flasks allow easier pouring and improved access to the flask for pipetting or scraping. The canted neck design was a Corning innovation that first appeared in 1974.



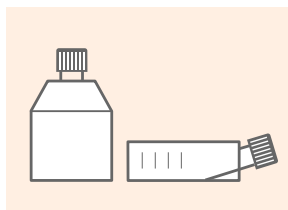
Angled neck improves pipette access and reduces medium sloshing into the neck. This patented design was a Corning innovation that first appeared in 1988.

Flask Shapes

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



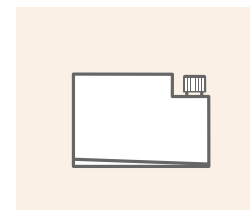
Triangular and modified triangular flasks offer good pipette and cell scraper access to the corners. The wider base provides added stability.



Rectangular flasks have a ramp from the bottom to the canted neck for easier pouring and pipette access. Most canted neck flasks also have an antitip 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.



RoboFlask vessels are robotics-compatible cell culture flasks offering 92.6 cm² cell growth surface area. The flasks are designed for use in automated cell culture systems utilizing a microplate-size format.



3056 25 cm² Triangular Flask with Vent Cap

Corning® Cell Culture Flask Ordering Information

25 cm² Growth Area Flasks

Cat. No.	Surface	Flask Style	Neck Style	Cap Style	Qty/Pk	Qty/Cs
CLS430168	TC	Rectangular	Canted	Plug Seal	20	500
CLS430372	TC	Rectangular	Canted	Phenolic-Style	20	500
CLS430639	TC	Rectangular	Canted	Vent Cap	20	200
CLS3055	TC	Triangular	Angled	Phenolic-Style	20	500
CLS3056	TC	Triangular	Angled	Vent Cap	10	200
CLS3289	Corning® CellBIND® Surface	Rectangular	Canted	Vent Cap	20	200

75 cm² Growth Area Flasks

Cat. No.	Surface	Flask Style	Neck Style	Cap Style	Qty/Pk	Qty/Cs
CLS430641	TC	Rectangular	Canted	Vent Cap	5	100
CLS430720	TC	Rectangular	Canted	Plug Seal	5	100
CLS430725	TC	Rectangular	Canted	Phenolic-Style	5	100
CLS3275	TC	Modified triangular	Straight	Phenolic-Style	5	100
CLS3276	TC	Modified triangular	Straight	Vent Cap	5	100
CLS3375	TC	Rectangular	Canted	Phenolic-Style	5	100
CLS3376	TC	Rectangular	Canted	Vent Cap	5	100
CLS3290	Corning CellBIND Surface	Rectangular	Canted	Vent Cap	5	100



430639 25 cm² Canted Neck Flask with Vent Cap



430641 75 cm² Canted Neck Flask with Vent Cap



3376 75 cm² Canted Neck Flask with Vent Cap



3275 75 cm² Triangular Flask with Phenolic-Style Cap



3070 RoboFlask Cell Culture Vessel with Septum Cap



431306 175 cm² Bar Coded Flasks with Vent Cap



430823 150 cm² Canted Neck Flask with Plug Seal Cap



431082 225 cm² Angled Neck Flask with Vent Cap



3001 225 cm² Canted Neck Flask with Vent Cap

Cell Culture Flask Application Tip
Corning recommends 0.2 to 0.3 mL of medium per cm² of growth area.

RoboFlask™ Vessels

Cat. No.	Description	Qty/Pk	Qty/Cs
CLS3070	RoboFlask Cell Culture Vessel for automation, tissue culture treated, with bar code, septum cap, sterile	20	100
CLS3071	RoboFlask Cell Culture Vessel for manual use, tissue culture treated, with bar code, flat cap (without septum), sterile	20	100
CLS3069	RoboFlask Cell Culture Vessel for automation, tissue culture treated, with bar code, septum cap, sterile	10	50
CLS3059	RoboFlask Cell Culture Vessel for manual use, tissue culture treated, with bar code, flat cap (without septum), sterile	10	50

150 cm² Growth Area Flasks

Cat. No.	Surface	Flask Style	Neck Style	Cap Style	Qty/Pk	Qty/Cs
CLS430823	TC	Rectangular	Canted	Plug Seal	5	50
CLS430824	TC	Rectangular	Canted	Phenolic-Style	5	50
CLS430825	TC	Rectangular	Canted	Vent Cap	5	50
CLS3291	Corning® CellBIND® Surface	Rectangular	Canted	Vent Cap	5	50

175 cm² Growth Area Flasks

Cat. No.	Surface	Flask Style	Neck Style	Cap Style	Qty/Pk	Qty/Cs
CLS431079	TC	Rectangular	Angled	Plug Seal	5	50
CLS431080	TC	Rectangular	Angled	Vent Cap	5	50
CLS431085	TC	Rectangular	Angled	Phenolic-Style	5	50
CLS431306*	TC	Rectangular	Angled	Vent Cap	7	84
CLS431328	Corning CellBIND Surface	Rectangular	Angled	Vent Cap	7	84
CLS3292	Corning CellBIND Surface	Rectangular	Angled	Vent Cap	5	50
CLS3298	CorningCellBIND Surface	Rectangular	Angled	Phenolic-Style	5	50

*Flask prelabeled with bar code, validated for use with Select™ Robotic System.

225 cm² Growth Area Flasks

Cat. No.	Surface	Flask Style	Neck Style	Cap Style	Qty/Pk	Qty/Cs
CLS431081	TC	Traditional	Canted	Plug Seal	5	25
CLS431082	TC	Traditional	Canted	Vent Cap	5	25
CLS3000	TC	Rectangular	Canted	Phenolic-Style	4	24
CLS3001	TC	Rectangular	Canted	Vent Cap	4	24
CLS3293	Corning CellBIND Surface	Traditional	Angled	Vent Cap	5	25

Cell Yields and Recommended Medium Volume

Corning® and Costar® Flasks	Approximate Growth Area (cm ²)	Average Cell Yield*	Recommended Medium Volume (mL)	Maximum Working Volume (mL)†
25 cm ²	25	2.5 x 10 ⁶	5 - 7.5	10
75 cm ² Canted neck	75	7.5 x 10 ⁶	15 - 22.5	60
75 cm ² Straight neck	75	7.5 x 10 ⁶	15 - 22.5	90
RoboFlask™ Vessel	94	9.4 x 10 ⁶	20 - 30	70
150 cm ²	150	1.5 x 10 ⁷	30 - 45	210
162 cm ²	162	1.6 x 10 ⁷	32 - 48	175
175 cm ²	175	1.75 x 10 ⁷	35 - 52.5	250
225 cm ²	225	2.25 x 10 ⁷	45 - 67.5	370

*Assumes an average yield of 1 x 10⁵ cells/cm² from a 100% confluent culture. Yields from many cell types can be lower than this.

† Maximum working volume is the amount a flask can hold in the horizontal position when filled to the neck.

Cell Culture Dishes



Vero cells plated at 2.6 x 10⁶ cells per well grown for 4 days at 37°C in a 5% CO₂ environment show a 99% reduction in cellular attachment vs. standard culture treated product.



430196 Gridded 60 mm Dish



430167 100 mm Dish



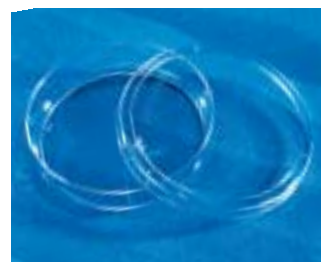
431112 500 cm² DW Spillguard Dish



431110 500 cm² Cell Culture Dish



3261 and 3262 Ultra Low Attachment Dishes



3296 Corning® CellBIND® Surface 100 mm Dishes

Ultra Low Attachment Dishes

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.

Cat. No.	Dish Style (mm)*	Height (mm)	Growth Area (cm ²)	Qty/Pk	Qty/Cs
CLS3261	60	15		21	5/20
CLS3262	100	20		55	5/20

*60 mm dish = 51.4 mm; 100 mm dish = 80.5 mm

Corning® Cell Culture Treated Dishes

- ▶ Manufactured from optically-clear virgin polystyrene
- ▶ Treated for optimal cell attachment
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic
- ▶ Have stacking beads to aid in handling
- ▶ Supplied with vents to provide consistent gas exchange

Corning Cell Culture Dish Ordering Information

Cat. No.	Surface	Dish Style ^a (mm)	Approx. Height (mm)	Growth Area (cm ²)	Qty/Pk	Qty/Cs
CLS3294	Corning® CellBIND® Surface	35	10	8	10	210
CLS430165	TC	35	10	8	20	500
CLS430166	TC	60	15	21	20	500
CLS3295	Corning CellBIND Surface	60	15	21	7	126
CLS3261	Ultra Low Attachment	60 ^b	20	21	5	20
CLS3262	Ultra Low Attachment	100 ^b	20	55	5	20
CLS430196	TC	60 with 2 mm grid	15	21	20	500
CLS3296	Corning CellBIND Surface	60 with 2 mm grid	15	21	20	40
CLS430167	TC	100	20	55	20	500
CLS430293 ^c	TC	100	20	55	10	480
CLS430599	TC	150	25	151	5	60
CLS431110 ^d	TC	245	25	500	4	16
CLS431112 ^e	TC	245	25	500	4	16

^aDish style (mm) = actual growth surface diameters: 35 mm dish = 33.9 mm; 60 mm dish = 51.4 mm; 100 mm dish = 80.5 mm; 150 mm dish = 138.7 mm.

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

^cCat. No. 430293 consists of 6-pack carriers, each containing 6 packages of 10 dishes each.

^dCat. Nos. 431110 and 431112 are square dishes with interior bottom plate dimensions of 224 mm x 224 mm.

^eCat. No. 431112 is a square dish featuring a removable spillguard.

Corning® Nontreated Cell Culture Dishes

- ▶ Manufactured from optically clear virgin polystyrene
- ▶ Not cell culture treated for applications where cell attachment is not desired
- ▶ Have stacking beads to aid in handling
- ▶ Supplied with vents to provide consistent gas exchange
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic

Corning Nontreated Cell Culture Dish Ordering Information

Cat. No.	Dish Style* (mm)	Height (mm)	Approx. Growth Area (cm ²)	Qty/Pk	Qty/Cs
CLS430588	35	10	8	20	500
CLS430589	60	15	21	20	500
CLS430591	100	20	55	20	500
CLS430597	150	25	148	5	60
CLS431111 [†]	245	25	500	4	16

*Note: Dish style (mm) = actual growth surface diameters: 35 mm dish = 33.9 mm; 60 mm dish = 51.4 mm; 100 mm dish = 80.5 mm; 150 mm dish = 134.5 mm.

[†]Cat. No. 431111 is a square dish with interior bottom plate dimensions of 224 mm x 224 mm.

Cell Culture Dish Application Tips

- ▶ The 150 and 245 mm culture dishes make excellent carriers and incubator trays for 35 and 60 mm dishes. This helps prevent spills and reduces opportunities for contamination.
- ▶ Corning recommends 0.2 to 0.3 mL of medium per cm² of growth area.

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 x 10 ⁵	1.6 - 2.4
60 mm	21	2.1 x 10 ⁶	4.2 - 6.3
100 mm	55	5.5 x 10 ⁶	11 - 16.5
150 mm	148	1.48 x 10 ⁷	30 - 45
245 mm (square)	500	5.0 x 10 ⁷	100 - 150

*Assumes an average yield of 1 x 10⁵ cells/cm² from a 100% confluent culture.

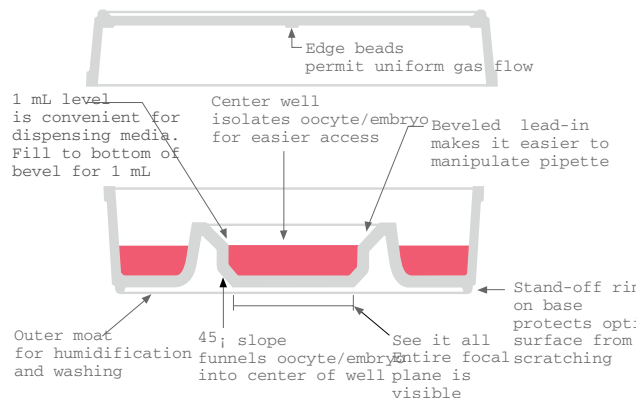
†Yields from many cell types can be lower than this.

Costar® IVF Culture Dish



3260 IVF Culture Dish

- ▶ 20 mm center well
- ▶ Inner well holds 3 mL of medium while the outer well holds 10 mL
- ▶ Treated for optimal cell attachment
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic
- ▶ For research use only



Costar IVF Culture Dish Ordering Information

Cat. No.	Size (mm)	Description (mm)	Center Well (mm)	Qty/Pk	Qty/Cs
CLS3260	60	60 x 15	20	20	500

Multiple Well Plates

Costar® 6, 12, 24, and 48 Well Cell Culture Plates

- ▶ Flat bottoms
- ▶ Nonreversible lids with condensation rings to reduce contamination
- ▶ Individual alphanumeric codes for well identification
- ▶ Uniform footprint for ease in stacking
- ▶ Treated for optimal cell attachment (except where noted)
- ▶ Sterilized by gamma irradiation
- ▶ Certified nonpyrogenic



3516 6 Well Culture Plate



3513 12 Well Culture Plate



3524 24 Well Culture Plate



3548 48 Well Culture Plate

6, 12, 24, and 48 Well Plates Ordering Information

Cat. No.	Surface	Plate Type	Qty/Pk	Qty/Cs
6 Well Plates				
CLS3335	Corning® CellBIND® Surface	Standard clear plate	5	50
CLS3506	TC	Standard clear plate	5	100
CLS3516	TC	Standard clear plate	1	50
CLS3471	Ultra Low Attachment	Standard clear plate with hydrogel*	1	24
12 Well Plates				
CLS3336	Corning CellBIND Surface	Standard clear plate	5	50
CLS3512	TC	Standard clear plate	5	100
CLS3513	TC	Standard clear plate	1	50
24 Well Plates				
CLS3337	Corning CellBIND Surface	Standard clear plate	5	50
CLS3524	TC	Standard clear plate	1	100
CLS3526	TC	Standard clear plate	1	50
CLS3527	TC	Standard clear plate	5	100
CLS3473	Ultra Low Attachment	Standard plate with hydrogel*	1	24
48 Well Plates				
CLS3548	TC	Standard clear plate	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.

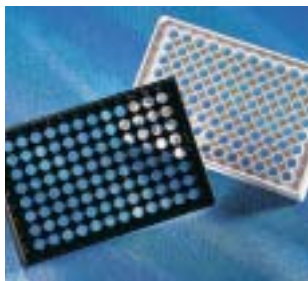
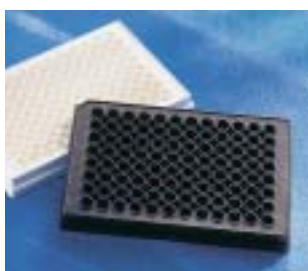
Well Dimensions, Expected Cell Yields, and Recommended Medium Volumes

Cell Culture Plates	Well Diameter (Bottom, mm)	Single Well Only				Entire Plate		
		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 x 10 ⁵	16.8	1.9 - 2.9	57	5.7 x 10 ⁶	11.4 - 17.1
12 well	22.1	3.8	3.8 x 10 ⁵	6.9	0.760 - 1.14	45.6	4.56 x 10 ⁶	9.1 - 13.7
24 well	15.6	1.9	1.9 x 10 ⁵	3.4	0.380 - 0.570	45.6	4.56 x 10 ⁶	9.1 - 13.7
48 well	11	0.95	8.0 x 10 ⁴	1.6	0.19 - 0.285	45.6	38.4 x 10 ⁶	9.1 - 13.7

*Assumes an average yield of 1 x 10⁵ cells/cm² from a 100% confluent culture. Yields from many cell types can be lower than this.



3596 96 Well Culture Plate

3610 and 3603
96 Well Clear Bottom Plates3917 and 3916
96 Well Solid Plates

Corning® and Costar® 96 Well Cell Culture Plates

- ▶ Flat bottoms (except where noted)
- ▶ Nonreversible lids with condensation rings to reduce contamination (except where noted)
- ▶ Treated for optimal cell attachment (except where noted)
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic
- ▶ Individual alphanumeric codes for well identification

Black plates are designed to lower background in fluorescent assays and reduce crosstalk. White plates are designed for luminescent assays. Some plates have a poly-D-lysine coating to enhance cell attachment. Corning offers many other 96 well plate types for applications other than cell culture; for a complete listing, check the catalog at www.corning.com/lifesciences.

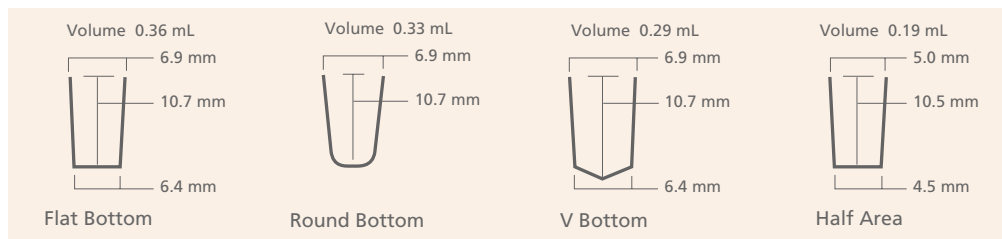
96 Well Plate Ordering Information

Cat. No.	Surface	Description	Qty/ Pk	Qty/ Cs
Clear Plates				
CLS3300	Corning® CellBIND® Surface	Standard clear plate	5	50
CLS3596	TC	Standard clear plate	1	50
CLS3997	TC	Standard clear plate	10	50
CLS3598	TC	Standard clear plate	5	100
CLS3599	TC	Standard clear plate	1	100
CLS3585	TC	Standard clear plate with special low evaporation lid	5	50
CLS3595	TC	Standard clear plate with special low evaporation lid	1	50
CLS3594	TC	Standard clear plate without lid	1	100
CLS3697	TC	96 well half area clear plate	20	100
CLS3790	TC	96 well round bottom, polypropylene plate with polystyrene lid	1	50
CLS3799	TC	96 well round bottom clear plate	1	50
CLS3894	TC	96 well V-bottom clear plate	1	50
CLS3665	poly-D-lysine	Standard clear plate, coated	25	100
CLS9102	TC	8-well strip plate, assembled 12 strips per plate	1	50
CLS3474	Ultra Low Attachment	Standard clear plate with hydrogel*	1	24
White Plates				
CLS3917	TC	Solid white plate	20	100
CLS3362	TC	Solid white plate without lid	25	100
CLS3688	TC	96 well half area solid white plate	20	100
CLS3610	TC	White plate with clear bottom	1	48
CLS3903	TC	White plate with clear bottom	20	100
CLS3666	poly-D-lysine	White plate with clear bottom	25	100
Black Plates				
CLS3340	Corning CellBIND Surface	Black plate with clear bottom with lid	5	50
CLS3916	TC	Solid black plate	20	100
CLS3603	TC	Black plate with clear bottom	1	48
CLS3904	TC	Black plate with clear bottom	20	100
CLS3667	poly-D-lysine	Black plate with clear bottom	25	100
CLS3614	TC	Black plate with special optics, ultrathin, clear bottom, without lid	25	100
Lids and Tape				
CLS3099	–	Universal lid	25	50
CLS3345	–	Breathable Sealing tape, Sterile	50	500
CLS3930	–	Rigid styrene lid with condensation rings	1	100
CLS3931	–	Rigid styrene lid with condensation rings	25	50

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

96 Well Cell Culture Plates

Well Geometry

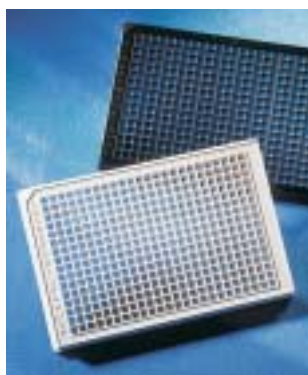


Well Dimensions, Expected Cell Yields, and Recommended Medium Volume

Cell Culture Plates	Well Diameter (Bottom, mm)	Single Well Only				Entire Plate		
		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 x 10 ⁴	0.36	0.100 - 0.200	30.7	3.07 x 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 x 10 ⁴	0.29	0.100 - 0.200	36.5	3.65 x 10 ⁶	9.6 - 19.2
96 half area	4.5	0.16	1.6 x 10 ⁴	0.19	0.050 - 0.100	15.4	1.54 x 10 ⁶	4.8 - 9.6

*Assumes an average yield of 1 x 10⁵ cells/cm² 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.

384 Well Cell Culture Plates



3707 and 3712
384 Well Clear Bottom Plates

- ▶ Flat bottoms
- ▶ Nonreversible lids
- ▶ Treated for optimal cell attachment
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic

Black plates are designed to lower background in fluorescent assays and reduce crosstalk. White plates are designed for luminescent assays. Some plates have a poly-D-lysine coating to enhance cell attachment. Corning offers many other 384 well plate types for applications other than cell culture; for a complete listing, check the catalog at www.corning.com/lifesciences.

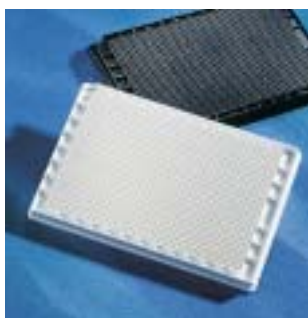
384 Well Cell Culture Plate Ordering Information

Cat. No.	Surface	Description	Qty/Pk	Qty/Cs
Clear Plates				
CLS3701	TC	Standard clear plate	20	100
CLS3662	poly-D-lysine	Standard clear plate	25	100
White Plates				
CLS3704	TC	Solid white plate	20	100
CLS3707	TC	White plate with clear bottom	20	100
CLS3663	poly-D-lysine	White plate with clear bottom	25	100
Black Plates				
CLS3709	TC	Solid black plate	20	100
CLS3712	TC	Black plate with clear bottom	20	100
CLS3664	poly-D-lysine	Black plate with clear bottom	25	100
CLS3683	Corning® CellBIND® Surface	Black plate with clear bottom with lid	10	50

Well Dimensions, Expected Cell Yields, and Recommended Medium Volumes

Cell Culture Plates	Well Diameter (Bottom, mm)	Single Well Only				Entire Plate		
		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)
384 well	2.7 x 2.7 [†]	0.056	5.6 x 10 ³	0.125	.025 - .050	21.5	2.15 x 10 ⁶	9.6 - 19.2

*Assumes an average yield of 1 x 10⁵ cells/cm² from a 100% confluent culture. Yields from many cell types can be lower than this.
[†]These wells are square.



3955 and 3954
1536 Well Culture Plates

1536 Well Cell Culture Plates

- ▶ Flat bottoms with no lids (Top plate serves as lid for plate underneath.)
- ▶ Eight extra wells on left and right sides that can be used for running controls
- ▶ Treated for optimal cell attachment
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic

Black plates are designed to lower background in fluorescent assays and reduce crosstalk. White plates are designed for luminescent assays. Corning offers other 1536 well plate types for applications other than cell culture; for a complete listing, check the catalog at www.corning.com/lifesciences.

1536 Well Cell Culture Plate Ordering Information

Cat. No.	Description	Qty/Pk	Qty/Cs
Clear Plates			
CLS3853	Standard clear plate	20	100
White Plates			
CLS3855	Solid white plate	20	100
Black Plates			
CLS3854	Solid black plate	20	100

Well dimensions, Expected Cell Yields, and Recommended Medium Volumes

Cell Culture Plates	Well Diameter (Bottom, mm)	Single Well Only				Entire Plate		
		Approx. Growth Area (cm ²)	Average Cell Yield*	Total Well Volume (μL)	Working Volume (μL)	Approx. Growth Area (cm ²)	Average Cell Yield*	Working Volume (mL)
1536 well	1.2	0.011	1.2 x 10 ³	2.3	1.0 - 1.5	16.9	1.69 x 10 ⁶	1.5 - 2.3

*Assumes an average yield of 1 x 10⁵ cells/cm² from a 100% confluent culture. Yields from many cell types can be lower than this.

Transwell® Permeable Supports

Transwell cell culture inserts are convenient, easy-to-use permeable support devices for the study of both anchorage-dependent and anchorage-independent cell lines.

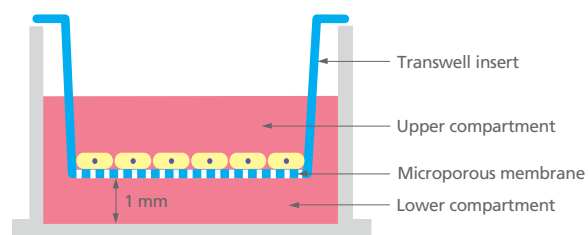
- ▶ Designed to produce a cell culture environment that closely resembles the in vivo state
- ▶ Allows polarized cells to feed basolaterally and thereby carry out metabolic activities in a more natural fashion
- ▶ Unique patented self-centered hanging design prevents medium wicking between the insert and outer well.
- ▶ Permits access to the lower compartment through windows in the insert wall
- ▶ Suspended design allows for undamaged co-culturing of cells in the lower compartment
- ▶ Available in a range of pore sizes and different membranes to satisfy diverse experimental requirements

Characteristics of Transwell® Membranes

Characteristics	Polyester (PET)	Polycarbonate	PTFE/Collagen
Optical properties	Clear	Translucent	Clear when wet
Cell visibility	Good	Poor	Cell outlines
Tissue culture treated	Yes	Yes	No
Membrane thickness	10 µm	10 µm	50 µm
Matrix/ECM coatable	Yes	Yes	Yes
Collagen treated	No	No	Yes
Available Pore Sizes (µm)	0.4, 3.0	0.1, 0.4, 3.0, 5.0, 8.0, 12.0	0.4, 3.0

Chemical Compatibility

All of the Transwell membranes are compatible with histological fixatives including methanol and formaldehyde. The polyester Transwell membranes have the best overall chemical resistance. These membranes (but not the polystyrene housings) are compatible with many alcohols, amines, esters, ethers, ketones, oils and some solvents, including many halogenated hydrocarbons and DMSO but are not recommended for use with strong acids and bases.



Transwell® Permeable Supports Tip

Check the Corning web site (www.corning.com/lifesciences) for an extensive list of references, listed by application, citing the use of Transwell permeable supports in cell culture research.

Pore Density

Of the three types of Transwell membranes, only the PTFE does not have a defined pore density because it is a tortuous path membrane. The two membranes with a nominally defined pore density are polycarbonate and polyester. The polyester Transwell membranes do not have as high a pore density as the polycarbonate Transwell but have better optical clarity as a result. The nominal pore densities for Corning® Polycarbonate and Polyester (PET) membranes are given in the following table.

Nominal Pore Densities for Transwell Polyester and Polycarbonate Membranes

Pore Size	Nominal Pore Density	
	Polycarbonate Membrane Transwell (pores/cm ²)	Transwell-Clear Polyester Membrane (pores/cm ²)
0.1 µm	3 x 10 ⁸	n/a
0.4 µm	1 x 10 ⁸	4 x 10 ⁶
3.0 µm	2 x 10 ⁶	2 x 10 ⁶
5.0 µm	4 x 10 ⁵	n/a
8.0 µm	1 x 10 ⁵	n/a
12.0 µm	1 x 10 ⁵	n/a

Growth Areas and Recommended Medium Volumes for Transwell Permeable Supports

Transwell Insert Diameter (mm)	Insert Membrane Growth Area (cm ²)	Multiple Well Plate or Dish Type	Volume Added per Plate Well	Volume Added to Inside of Transwell Insert (mL)
4.26	.143	96 HTS	–	–
6.5	0.33	24 well	0.6	0.1
12	1.12	12 well	1.5	0.5
24	4.67	6 well	2.6	1.5
75	44	100 mm dish	13	9



3401 12 mm Polycarbonate Transwell Insert



3419 75mm Polycarbonate Transwell Insert



3450 24 mm Transwell-Clear Insert

Transwell® Polycarbonate Membrane Insert

- ▶ 10 µm translucent membrane
- ▶ Pore sizes ranging from 0.1 µm to 12 µm
- ▶ Treated for optimal cell attachment
- ▶ Supplied in multiple well plates
- ▶ Membrane must be stained for cell visibility
- ▶ Sterilized by gamma radiation

Transwell Polycarbonate Membrane Permeable Support Ordering Information

Cat. No.	Membrane Diameter (mm)	Growth Surface Area (cm ²)	Membrane Pore Size (µm)	Tissue Culture Treated	Inner Packaging*	Inserts/Cs
CLS3413	6.5	0.33	0.4	Yes	12/plate*	48
CLS3415	6.5	0.33	3.0	Yes	12/plate*	48
CLS3421	6.5	0.33	5.0	Yes	12/plate*	48
CLS3422	6.5	0.33	8.0	Yes	12/plate*	48
CLS3423	6.5	0.33	0.1	No	12/plate*	48
CLS3401	12	1.12	0.4	Yes	12/plate	48
CLS3402	12	1.12	3.0	Yes	12/plate	48
CLS3403	12	1.12	12.0	Yes	12/plate	48
CLS3412	24	4.67	0.4	Yes	6/plate	24
CLS3414	24	4.67	3.0	Yes	6/plate	24
CLS3428	24	4.67	8.0	Yes	6/plate	24
CLS3419	75	44	0.4	Yes	1/dish	12
CLS3420	75	44	3.0	Yes	1/dish	12

Transwell-Clear Polyester Membrane Insert

- ▶ 10 µm transparent membrane
- ▶ Treated for optimal cell attachment
- ▶ Excellent visibility under phase contrast microscopy
- ▶ Supplied in multiple well plates
- ▶ Sterilized by gamma radiation

Transwell-Clear Insert Ordering Information

Cat. No.	Membrane Diameter (mm)	Growth Surface Area (cm ²)	Membrane Pore Size (µm)	Inner Packaging*	Inserts/Cs
CLS3450	24	4.67	0.4	6/plate	24
CLS3452	24	4.67	3.0	6/plate	24
CLS3460	12	1.12	0.4	12/plate	48
CLS3462	12	1.12	3.0	12/plate	48
CLS3470	6.5	0.33	0.4	12/plate*	48
CLS3472	6.5	0.33	3.0	12/plate*	48

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



3491 24 mm Transwell-COL
Collagen-Coated Insert

Transwell®-COL Collagen-Coated Membrane Insert

- ▶ Transparent collagen treated PTFE membrane
- ▶ Promotes cell attachment and spreading
- ▶ Equimolar mixture of types I and III collagen
- ▶ Individually packaged
- ▶ Multiple well plates included in each case
- ▶ Supplied sterile

Transwell-COL Insert Ordering Information

Cat. No.	Membrane Diameter (mm)	Growth Surface Area (cm ²)	Membrane Pore Size (µm)	Inner Packaging	Cluster	Inserts/Cs
CLS3491	24	4.7	0.4	Individual	6 well	24
CLS3492	24	4.7	3.0	Individual	6 well	24
CLS3493	12	1.1	0.4	Individual	12 well	24
CLS3494	12	1.1	3.0	Individual	12 well	24
CLS3495*	6.5	0.3	0.4	Individual	24 well	24
CLS3496*	6.5	0.3	3.0	Individual	24 well	24

*Includes twenty-four 6.5 mm inserts packaged separately with two 24 well plates.

Snapwell™ Inserts

- ▶ A modified Transwell® permeable support containing a 12 mm diameter membrane supported by a detachable ring
- ▶ Once cells are grown to confluence on the Snapwell insert, the ring can be placed in a vertical or horizontal diffusion chamber*
- ▶ Sterilized by gamma radiation
- ▶ Packaged in 6 well plates

Snapwell Insert Ordering Information

Cat. No.	Membrane Pore Size (µm)	Membrane	Inner Packaging	Inserts/Cs
CLS3407	0.4	Polycarbonate	6/plate	24
CLS3802	3.0	Polycarbonate	6/plate	24
CLS3801	0.4	Clear Polyester	6/plate	24

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



3407 12 mm Snapwell Inserts



3396 6.5 mm HTS Transwell Polycarbonate Insert

HTS Transwell-24 Membrane Insert

- ▶ Treated for optimal cell attachment
- ▶ Available in two pore sizes: 0.4 and 3.0 μm and, membrane types polycarbonate (PC) and polyester (PET)
- ▶ Individual or bulk pack
- ▶ Individual pack has 2 HTS Transwell-24 units loaded into 24 well plates and two open reservoirs
- ▶ Bulk pack has 12 HTS Transwell-24 units loaded into 24 well plates only. Reservoirs may be purchased separately
- ▶ Sterilized by gamma radiation

HTS Transwell Insert Ordering Information

Cat. No.	Description	Membrane Pore Size (μm)	Membrane	Packaging	Plates/Cs
CLS3396	HTS Transwell-24, individual	0.4	PC	1	2
CLS3397	HTS Transwell-24, bulk	0.4	PC	12	12
CLS3398	HTS Transwell-24, individual	3.0	PC	1	2
CLS3399	HTS Transwell-24, bulk	3.0	PC	12	12
CLS3395	HTS Transwell nontreated reservoir	n/a	PC	12	48
CLS3378	HTS Transwell-24, bulk	–	PET	12	12
CLS3379	HTS Transwell-24, individual	–	PET	1	2

Corning® HTS Transwell®-96 Tissue Culture Systems

- ▶ 96 well system, polycarbonate (PC) membrane, 0.4 μm pore size
- ▶ 96 well system, polyester (PET) membrane, 1.0 μm pore size
- ▶ 0.143 cm^2 membrane area per well, providing 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



HTS Transwell-96 System



Popper

HTS Transwell-96 Systems Ordering Information

Cat. No.	Product Description	Qty/Pk	Qty/Cs
CLS3380	HTS Transwell-96 System, 1.0 μm PET membrane, reservoir, and receiver plates, with 2 sterile lids	1	1
CLS3392	HTS Transwell-96 System, 1.0 μm PET membrane, reservoir, and receiver plates, with 2 sterile lids	1	5
CLS3381	HTS Transwell-96 System, 0.4 μm PC membrane, reservoir, and receiver plates, with 2 sterile lids	1	1
CLS3391	HTS Transwell-96 System, 0.4 μm PC membrane, reservoir, and receiver plate, with 2 sterile lids	1	5
CLS3382	HTS Transwell-96 Receiver Plate with lid	10	10
CLS3383	HTS Transwell-96 Reservoir Plate (Feeder) with removable media stabilizer and lid	10	10
CLS3389	8 Channel Aspirator for HTS Transwell-96 System, Autoclavable	1	1



Netwell Inserts

Netwell™ Inserts

- ▶ Costar® Netwell inserts have polyester mesh bottoms attached to polystyrene inserts
- ▶ They are used as tissue carriers, supports and strainers for culture of small organs, tissue slices or explants at the air-media interface
- ▶ Handy carrier during immunocytochemical staining of tissue slices (see accessories below)
- ▶ Provides coarse filtration of tissue homogenates, cell suspensions and microcarriers
- ▶ Available in two mesh sizes and diameters
- ▶ Supplied sterile and preloaded in 6- or 12-well microplates
- ▶ 24 mm Netwell inserts fit in Corning 50 mL plastic centrifuge tubes

Netwell Inserts Ordering Information

Cat. No.	Membrane Dia. (mm)	Polyester Membrane Mesh Size (µm)	Sterile	Inner Packaging	Inserts/Cs
CLS3477	15	74	Yes	12/plate	48
CLS3478	15	500	Yes	12/plate	48
CLS3479	24	74	Yes	6/plate	48
CLS3480	24	500	Yes	6/plate	48

Netwell Accessories



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

Netwell Accessories Ordering Information

Cat. No.	Description	Qty/Cs
CLS3517	Netwell Reagent Tray, black	200
CLS3519	Netwell Reagent Tray, white	200
CLS3520	Netwell Carrier Kit, 15 mm	8
CLS3521	Netwell Carrier Kit, 24 mm	8

Culture Tubes



430172 Culture Tube

Culture Tubes

- ▶ Manufactured from optically clear polystyrene
- ▶ Threaded plug seal caps prevent leakage
- ▶ Cell culture treated tubes supplied racked
- ▶ Untreated tubes provided bulk packed
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic

Culture Tube Ordering Information

Cat. No.	Treated	Size (mm)	Cap Style	Qty/Pk	Qty/Cs
CLS430157	No	16 x 125	Screw top	25	500
CLS430172	Yes	16 x 125	Screw top	50	500

Roller Bottles

430849 850 cm² Roller Bottle

Roller Bottles

- ▶ Manufactured from virgin polystyrene
- ▶ Treated for optimal cell attachment
- ▶ One piece seamless construction
- ▶ Most bottles have printed graduations.
- ▶ All bottles have printed lot numbers to aid in product traceability.
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic

Roller Bottle Ordering Information

Cat. No.	Surface	Surface Area (cm ²)	Cap Style	Graduations	Qty/Pk	Qty/Cs
CLS430195	TC	490	Plug Seal	No	2	40
CLS430699	TC	1,750	Easy Grip	Yes	10	20
CLS430849	TC	850	Easy Grip	Yes	2	40
CLS431133	TC	850	Easy Grip	Yes	20	20
CLS431198	TC	850	Easy Grip Vent	Yes	2	36
CLS430851	TC	850	Easy Grip	Yes	5	40
CLS3907	Corning® CellBIND® Surface	850	Easy Grip	Yes	2	40
CLS431329	Corning CellBIND Surface	850	Easy Grip Vent	Yes	2	40

Expanded Surface Roller Bottles

- ▶ Same features as standard roller bottles
- ▶ Ribbed design provides twice the surface area with the same exterior dimensions

Expanded Surface Roller Bottle Ordering Information

Cat. No.	Surface	Surface Area (cm ²)	Cap Style	Graduations	Qty/Pk	Qty/Cs
CLS430852	TC	1,700	Easy Grip	Yes	2	40
CLS430853	TC	1,700	Easy Grip	Yes	5	40
CLS431134	Corning CellBIND Surface	1,700	Easy Grip	Yes	20	20
CLS431135	TC	1,700	Easy Grip	Yes	20	20
CLS431191	TC	1,700	Easy Grip Vent	Yes	20	20



430852 Expanded Surface Roller Bottle

Expected Cell Yields and Recommended Medium Volumes

Corning® Roller Bottles	Approximate Growth Area (cm ²)	Average Cell Yield*	Recommended Medium Volume (mL)
490 cm ² roller bottle	490	4.9 x 10 ⁷	100 - 150
850 cm ² roller bottle	850	8.5 x 10 ⁷	170 - 255
1700 cm ² roller bottle	1,700	1.7 x 10 ⁸	340 - 510
1750 cm ² roller bottle	1,750	1.75 x 10 ⁸	350 - 525

*Assumes an average yield of 1 x 10⁵ cells/cm² from a 100% confluent culture. Yields from many cell types can be lower than this.

Roller Bottle Application Tips

- ▶ Corning recommends 0.2 to 0.3 mL of medium per cm² of growth area.
- ▶ Corning recommends setting roller rack speeds to provide 0.5 to 1.0 RPM.

Polyethylene Roller Bottle Caps

Caps are sold separately and are available individually wrapped in either Easy Grip or Easy Grip Vent Cap designs

Cat. No.	Cap Style	Qty/Pk	Qty/Cs
CLS430698	Easy Grip	1	100
CLS431132	Easy Grip Vent	1	300



Easy Grip Cap features large knurls designed for ergonomic handling.



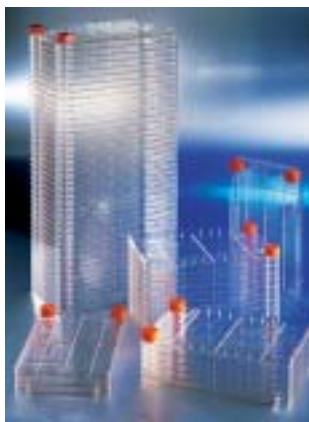
Easy Grip Vent Cap is designed for applications requiring consistent gas exchange.



Plug Seal Cap, designed for use in closed systems, provides a liquid- and gas-tight seal. When loosened, this cap can be used in open systems.

Corning is committed to partnering with you, our customer, to provide solutions that increase your efficiency and productivity. We offer the ability to customize packaging and cap design to meet your specific requirements. Minimum order quantities apply. Please call us or contact your local Corning Office for more details. See back cover for contact information.

Corning® CellSTACK® Culture Chambers



Corning CellSTACK Culture Chambers

- ▶ Available in Five Sizes
 - 1-Stack with 636 cm² cell growth area
 - 2-Stack with 1,272 cm² cell growth area
 - 5-Stack with 3,180 cm² cell growth area
 - 10-Stack with 6,360 cm² cell growth area
 - 40-Stack with 25,440 cm² cell growth area
- ▶ Greater Chamber Durability
 - Superior mechanical strength and structural integrity
 - Self-venting caps prevent pressure build-up during transport
 - 100% leak tested prior to shipping
- ▶ Greater Cleanliness
 - Improved assembly procedures reduce particulates
 - Certified nonpyrogenic and sterilized by gamma irradiation
- ▶ Continuous Supply Reliability
 - Manufactured in USA under GMP conditions
- ▶ Easier to Use
 - Larger openings with threaded closures and vented caps
 - Footprint identical to competitor's product



CellSTACK Chamber, 40-Stack

Corning® CellSTACK® Culture Chambers Ordering Information

Cat. No.	Surface	Growth Area (cm ²)	Description	Qty/Pk	Pk/Cs
CLS3330	Corning® CellBIND® Surface	636	CellSTACK Chamber, 1-Stack	–	8
CLS3268	TC	636	CellSTACK Chamber, 1-Stack	1	8
CLS3310	Corning CellBIND Surface	1,272	CellSTACK Chamber, 2-Stack	–	5
CLS3269	TC	1,272	CellSTACK Chamber, 2-Stack	1	5
CLS3311	Corning CellBIND Surface	3,280	CellSTACK Chamber, 5-Stack	–	2
CLS3319	TC	3,280	CellSTACK Chamber, 5-Stack	1	2
CLS3313	TC	3,280	CellSTACK Chamber, 5-Stack	1	8
CLS3320	Corning CellBIND Surface	6,360	CellSTACK Chamber, 10-Stack	–	6
CLS3312	Corning CellBIND Surface	6,360	CellSTACK Chamber, 10-Stack	–	2
CLS3270	TC	6,360	CellSTACK Chamber, 10-Stack	1	6
CLS3321	Corning CellBIND Surface	25,440	CellSTACK Chamber, 40-Stack	–	2
CLS3272	TC	25,440	CellSTACK Chamber, 40-Stack	1	2

Corning CellSTACK Filling Accessories Ordering Information



Cat. No.	Description	Qty/Cs
CLS3331	Stacking Device, ABS, nonsterile	5
CLS3332	Universal Cap*, with vented overcap, sterile	4
CLS3277	Vent cap, 0.2 mm GORE-TEX® PTFE membrane, sterile	5
CLS3279	Solid cap, sterile	5
CLS3281	Vent cap, 3/8" (9.5 mm) ID tubing, 7 cm length, Pall® Acro 50, PVDF filter, sterile	5
CLS3282	Fill cap, 1/8" (3.2 mm) ID tubing, female luer lock with male luer plug, sterile	5
CLS3283	Fill cap, 33 mm threaded cap with 3/8" (9.5 mm) ID tubing and 5/16" (7.94 mm) barbed fitting, sterile	5
CLS3284	Vent cap, 3/8" (9.5 mm) ID tubing, 7 cm length, Pall Bacterial Air Vent, sterile	4
CLS3324	Two vented over caps and one solid over cap for the Universal Cap, sterile	5
CLS3333	Fill cap*, 1/4" (6.4 mm) ID tubing, 70 cm length, male MPC coupling with female end cap, sterile	4
CLS3328	Fill cap, female MPC coupling, 1/4" (6.4 mm) ID barbed fitting with male end cap, male end cap, sterile	4
CLS3329	Fill cap, female MPC coupling with male end cap, 3/8" (9.5 mm) ID barbed fitting with male end cap, sterile	4
CLS3334	Fill cap, male MPC coupling, with male end cap, 1/4" (6.4 mm) ID barbed fitting with female end cap, sterile	4
CLS3339	Fill cap, male MPC coupling with male end cap, 3/8" (9.5 mm) ID barbed fitting with female end cap, sterile	4

*All caps are 33 mm thread caps.

CellCube® Systems



The CellCube System provides a fast, simple, and compact method for the mass culture of attachment-dependent cells. It uses a tissue culture treated growth surface for cell attachment, and continually perfuses the cells with fresh medium for increased cell productivity. The CellCube System is comprised of four pieces of capital equipment: the system controller, oxygenator, circulation, and media pumps and is designed to use disposable CellCube Modules. Performance data from the CellCube System can be easily scaled to the production system. Please inquire about CellCube System pricing. Corning provides on-site technical support for the CellCube System.

The CellCube Modules provide a traditional tissue culture treated surface for the growth of attachment dependent cells. The CellCube System provides an environment which more closely simulates in vivo conditions and reliably distributes nutrients and oxygen with low differential gradients across all cells within the modules.

CellCube Ordering Information

Cat. No.	Description	Qty/Cs
CLS3143	CellCube System; for use with CellCube Modules 3200, 3201, 3202, or 3203; consists of the following components:	
CLS3220	CellCube System Controller	1
CLS3101	CellCube Single Module System 6 Liter Oxygenator	1
CLS3222	CellCube Single Module System Circulation Pump	1
CLS3221	CellCube System Media Pump	1
CLS3139	CellCube Single Module System Secondary Oxygen Probe (25 x 70 mm)	1
CLS3138	CellCube Single Module System Secondary Oxygen Probe Holder	1
CLS3144	CellCube Single Module System Oxygen Probe Cable	1
CLS3165	CellCube Single Module System 12 mm Dissolved Oxygen Probe Membrane Kit	1
CLS3166	CellCube System 25 mm Dissolved Oxygen Probe Membrane Kit	1
CLS3136	CellCube Single Module System Stainless Steel Stand	1
CLS3135	CellCube Single Module System Setup Kit	1

Corning® E-Cube™ Culture System



Corning E-Cube Culture System

The E-Cube system provides a simple method to determine if your cells will grow in the CellCube® module prior to investing in the resources and funding that would be necessary for the larger, automated CellCube system.

Corning E-Cube Culture System Ordering Information

Cat. No.	Description	Qty/Pk	Qty/Cs
CLS3286	E-Cube System Kit (without CellCube module)	1	1
CLS3200	CellCube Module 10-Stack	1	2

Corning E-Cube Culture System Accessories Ordering Information

Cat. No.	Description	Qty/Pk	Qty/Cs
CLS430518	1 L Storage Bottle with cap	2	24
CLS401654	45 mm Cap with 2 stainless steel ports	1	1
CLS3287	E-Cube Fittings	1	1

Spinner Flasks



Disposable Spinner Flasks

Corning® Disposable Spinner Flasks

- ▶ The Corning disposable spinner flask system comes ready-to-use with paddle and integrated magnet, eliminating the need for time-consuming assembly or cleaning and reassembly.
- ▶ Molded from virgin polystyrene and gamma-irradiated, each spinner flask system assures a clean sterile unit. No more concerns with detergent residues or contamination.
- ▶ Made of USP XXXIII Class VI polystyrene, the vessel is comparable to conventional glass spinner flasks for growth of suspension cell lines and any attachment-dependent cultures using microcarrier beads.
- ▶ The paddle size and height is optimized for each vessel size. A unique integrated magnet provides smooth, even rotation at required speeds on any laboratory stir-plate. Heat build-up in the vessel is reduced by means of a specially designed flange that raises the vessel off the stir-plate surface.

Corning Disposable Spinner Flasks Ordering Information

Cat. No.	Description	Capacity (mL)	Center Neck (mm)	Sidearm Neck (mm)	Qty/Cs
CLS3152	Disposable Spinner Flask	125	70	25	1
CLS3153	Disposable Spinner Flask	500	100	45	1



4500-3L Spinner Flask

ProCulture® Glass Spinner Flask with Angled Sidearms

- ▶ Baffles enhance aeration and agitation of contents of the flask.
- ▶ Unique impeller design ensures optimal stirring.
- ▶ Sidearm designs permit easy access of 25 and 50 mL pipettes
- ▶ Visit www.corning.com/lifesciences to view additional Corning spinner flask accessories

ProCulture Spinner Flask Ordering Information

Cat. No.	Description	Capacity	Neck (mm)	Neck (mm)	Qty/Cs
CLS4500125	Spinner	125 mL	70	32	1
CLS4500250	Spinner	250 mL	70	32	1
CLS4500500	Spinner	500 mL	100	45	1
CLS45001L	Spinner	1L	100	45	1
CLS45003L	Spinner	3L	100	45	1
CLS45006L	Spinner	6L	100	45	1
CLS45008L	Spinner	8L	100	45	1
CLS450015L	Spinner	15L	100	45	1
CLS450036L	Spinner	36L	100	45	1

Erlenmeyer Flasks



431146 1L Erlenmeyer Flask

Shaker Flask Application Tip

Corning recommends starting with a shaking rate of 75-125 RPM (orbital shaker) and a medium volume of 30-40% of the nominal flask capacity.

Erlenmeyer Flasks

- ▶ Made from optically clear polycarbonate
- ▶ Ideal for shaker culture applications
- ▶ Two-position polypropylene plug seal cap can be opened for gas exchange or closed for a liquid-tight seal
- ▶ Vent caps available for applications requiring sterile gas exchange
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic

Erlenmeyer Flask Ordering Information

Cat. No.	Capacity (mL)	Graduation (mL)	Neck Diameter (mm)	Cap Style	Qty/Pk	Qty/Cs
CLS430421	125	25	26	Plug seal	1	50
CLS431143	125	25	26	Vent cap	1	50
CLS430183	250	25	31	Plug seal	1	50
CLS431144	250	25	31	Vent cap	1	50
CLS430422	500	50	43	Plug seal	1	25
CLS431145	500	50	43	Vent cap	1	25
CLS431146	1000	50	43	Plug seal	1	25
CLS431147	1000	50	43	Vent cap	1	25

2L and 3L Polycarbonate Flasks

- ▶ Made from optically clear polycarbonate
- ▶ Ideal for shaker culture applications
- ▶ Available in baffled and nonbaffled bottoms
- ▶ Vent caps supplied in every case of product for applications requiring sterile gas exchange
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic



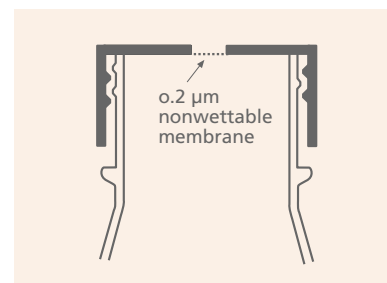
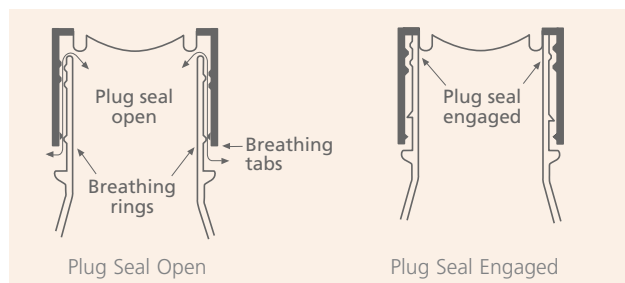
431256 2L Erlenmeyer Flask

Polycarbonate Flask Ordering Information

Cat. No.	Description	Sterile	Qty/Cs
CLS431255	Erlenmeyer Flask, 2L, polycarbonate	Yes	6
CLS431256	Erlenmeyer Flask, 2L, polycarbonate, baffled bottom	Yes	6
CLS431252	Fernbach Culture Flask, 3L, polycarbonate	Yes	4
CLS431253	Fernbach Culture Flask, 3L, polycarbonate, baffled bottom	Yes	4
CLS431339	Cap, Vented, 48 mm for 2L flask	Yes	24
CLS431340	Cap, Vented, 70 mm for 3L flask	Yes	24



431253 3L Fernbach Culture Flask



Breathable two-position plug seal caps feature one-piece linerless construction with a flexible plug for a gas- and liquid-tight seal. In addition, the unique breathable cap design allows use in either an open or closed mode.

Vent caps contain a 0.2 µm nonwetable membrane sealed to the cap, providing consistent, sterile gas exchange while minimizing the risk of contamination.

Cell Scrapers and Lifters



3008 Cell Lifter



3010 Small Cell Scraper

Cell Scrapers and Cell Lifters

- ▶ 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 in dishes
- ▶ Scrapers designed for use in flasks
- ▶ Individually wrapped
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic

Cell Scraper and Lifter Ordering Information

Cat. No.	Description	Blade Length (cm)	Handle Length (cm)	Qty/Pk	Qty/Cs
CLS3008	Cell lifter	1.9	18	1	100
CLS3010	Small scraper	1.8	25	1	100
CLS3011	Large scraper	3.0	39	1	100

Spatulas and Microspatulas



Spatulas



Microspatulas

- ▶ Corning® spatulas are designed to save researcher's time and to provide them with contamination-free samples
- ▶ Each spatula is individually packaged, certified RNase-/DNase-free, nonpyrogenic, antistatic, and sterile
- ▶ They are specifically targeted toward researchers interested in eliminating the recycling and resterilizing necessary with reusable spatulas
- ▶ Spatulas are available in five different configurations

Spatulas Ordering Information

Cat. No.	Description	Qty/Cs
CLS3003	Spatula, Tapered Blade/Spoon	100
CLS3004	Spatula, Small Spoon/Spoon	100
CLS3005	Spatula, Round End/Spoon	100
CLS3006	Spatula, V-Scoop/Spoon	100
CLS3007	Spatula, Flat End/Spoon	100
CLS3012	Microspatula, tapered end/scoop	50
CLS3013	Microspatula, rounded end/scoop	50

Pipets



Stripette Serological Pipets



Three packaging options



Exclusive Antidrip Tip

Stripette® Serological Pipets

- ▶ Exclusive antidrip tip assures accurate delivery
- ▶ Available in 25, 50, and 100 mL sizes
- ▶ Color-coded magnifier stripes make volume reading easier
- ▶ Bidirectional graduations provide choice of ascending and descending scales
- ▶ Negative graduations allow additional working volume
- ▶ Three packaging options:
 - Individually wrapped, clear plastic
 - Individually wrapped, paper/plastic
 - Bulk packed for large-scale sterile and nonsterile liquid handling applications

Stripette Pipets Ordering Information

Cat. No.	Capacity (mL)	Graduations (mL)	Negative Grads. (mL)	Color Coded Stripe	Qty/Pk	Qty/Cs
Individually Wrapped, Clear Plastic Wrap						
CLS4011	1	1/100	0.2	Yellow	100/bag	1,000
CLS4012	1	1/100	0.2	Yellow	100/bag	200
CLS4021	2	1/100	0.2	Green	100/bag	1,000
CLS4051	5	1/10	2.5	Blue	50/bag	200
CLS4101	10	1/10	3.0	Orange	50/bag	200
CLS4492*	10	1/10	3.0	Orange	50/bag	200
CLS4251	25	2/10	10.0	Red	50/bag	200
CLS4501	50	1/2	10.0	Purple	25/bag	100
CLS4484	100	1	N/A	Aqua	10/bag	100
Individually Wrapped, Paper/Plastic Wrap						
CLS4485	1	1/100	0.2	Yellow	50/bag	1,000
CLS4486	2	1/100	0.2	Green	50/bag	1,000
CLS4487	5	1/10	2.5	Blue	50/bag	200
CLS4488	10	1/10	3.0	Orange	50/bag	200
CLS4489	25	2/10	10.0	Red	25/bag	200
CLS4490	50	1/2	10.0	Purple	25/bag	100
CLS4491	100	1/1	N/A	Aqua	10/bag	100
Bulk Packed in Bags						
CLS4010	1	1/100	0.2	Yellow	50/bag	1,000
CLS4020	2	1/100	0.2	Green	50/bag	1,000
CLS4050	5	1/10	2.5	Blue	50/bag	500
CLS4100	10	1/10	3.0	Orange	50/bag	500
CLS4250	25	2/10	10.0	Red	25/bag	200
CLS4500	50	1/2	10.0	Purple	25/bag	100

*Cat. No. 4492 features a wide tip for handling viscous fluids.

Cryogenic Vials and Accessories

Corning offers three styles of cryogenic vials as well as storage racks and boxes.

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.



External Thread Cryogenic Vials



External Thread Cryogenic Vial

- ▶ Color-coded polypropylene cap inserts simplify vial identification. Available in variety packs of white, blue, green, red, and yellow.
- ▶ Silicone washer provides a secure seal.
- ▶ Easy-to-read black graduations for partial volumes
- ▶ Self-standing base, self-locking skirt



Internal Thread Cryogenic Vial

- ▶ Color-coded polypropylene cap inserts simplify vial identification. Available in variety packs of white, blue, green, red, and yellow.
- ▶ Silicone washers or rubber O-rings provide a secure seal.
- ▶ Easy-to-read black graduations for partial volumes
- ▶ Self-standing base, self-locking skirt



External Thread Plug Seal Cap

- ▶ Sure-grip plug seal screw cap
- ▶ Inner cap ring assures a tight seal.



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

External Thread Cryogenic Vials

- ▶ Manufactured from polypropylene to withstand temperatures down to -196°C
- ▶ Larger marking spot
- ▶ Black graduations
- ▶ Certified RNase-/DNase-free
- ▶ Vials have a silicone washer for a secure seal.
- ▶ Vials may be color coded with inserts (Cat. No. 430499)
- ▶ Self-standing vials have a special base design allowing them to be locked into cryogenic rack and tray (Cat. No. 430525 or 431131) for single-handed manipulation
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic
- ▶ Free foam rack with each case

External Thread Cryogenic Vials Ordering Information

Cat. No.	Capacity (mL)	Style	Self-Standing	Qty/Pk	Qty/Cs
CLS430658	1.2	Conical Bottom	Yes	50	500
CLS430659	2.0	Round Bottom	Yes	50	500
CLS430661	2.0	Round Bottom	No	50	500
CLS430662	4.0	Round Bottom	Yes	50	500
CLS430663	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 liquified gas. Always use appropriate safety equipment when removing vials from cryogenic storage.



Internal Thread Cryogenic Vials

Internal Thread Cryogenic Vials

- ▶ Manufactured from polypropylene to withstand temperatures down to -196°C
- ▶ Larger marking spot
- ▶ Black graduations
- ▶ Certified RNase-/DNase-free
- ▶ Vials have a silicone washer or rubber O-ring for a secure seal
- ▶ Vials may be color coded with inserts (Cat. No. 430499)
- ▶ Self-standing vials have a special base design allowing them to be locked into cryogenic rack and tray (Cat. No. 430525 or 431131) for single-handed manipulation
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic
- ▶ Free foam rack with each case

Internal Thread Cryogenic Vials Ordering Information

Capacity Cat. No.	(mL)	Style	Self- Standing	Seal Type	Qty/Pk	Qty/Cs
CLS430487	1.2	Conical Bottom	Yes	Washer	50	500
CLS2012	1.2	Conical Bottom	Yes	O-Ring	50	250
CLS430488	2.0	Round Bottom	Yes	Washer	50	500
CLS430489	2.0	Round Bottom	No	Washer	50	500
CLS2027	2.0	Round Bottom	No	O-Ring	50	250
CLS2028	2.0	Round Bottom	Yes	O-Ring	50	250
CLS430490	4.0	Round Bottom	No	Washer	50	500
CLS430491	4.0	Round Bottom	Yes	Washer	50	500
CLS430492	5.0	Round Bottom	No	Washer	50	500
CLS430656	5.0	Round Bottom	Yes	Washer	50	500
CLS2051	5.0	Round Bottom	No	O-Ring	50	250

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

External Thread Cryogenic Vials with Plug Seal Cap

- ▶ Manufactured from polypropylene to withstand temperatures down to -196°C
- ▶ Vials feature an external thread with a traditional plug seal cap design for a secure seal
- ▶ Cap does not accept color-coded inserts
- ▶ Sterilized by gamma radiation
- ▶ Certified nonpyrogenic

External Thread Cryogenic Vials with Plug Seal Cap Ordering Information

Cat. No.	Capacity (mL)	Style	Self-Standing	Qty/Pk	Qty/Cs
CLS430289	2.0	Round Bottom	No	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 liquified gas. Always use appropriate safety equipment when removing vials from cryogenic storage.



430289 External Thread Cryogenic Vials with Plug Seal Cap



430499 Color-Coded Cap Inserts

Cap Inserts for Cryogenic Vials

- ▶ Caps inserts provide color coding for easy sample identification
- ▶ Inserts are packaged in resealable bags
- ▶ Nonsterile
- ▶ Cap inserts fit all Corning® cryogenic vials except Cat. No. 430289

Cryogenic Vials Cap Inserts Ordering Information

Cat. No.	Description	Qty/Pk	Qty/Cs
CLS430499	Assorted colors, polypropylene cap inserts: 100 each of white, blue, red, green, and yellow	50	500
CLS2015	White polypropylene cap inserts	50	500
CLS2016	Blue polypropylene cap inserts	50	500
CLS2017	Red polypropylene cap inserts	50	500
CLS2018	Green polypropylene cap inserts	50	500
CLS2019	Yellow polypropylene cap inserts	50	500

430525 and 431131
Cryogenic Vial Racks

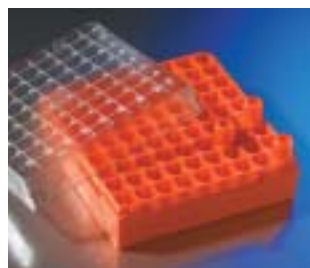
Cryogenic Vial Racks and Storage Boxes

- ▶ Reusable racks are designed for use with most cryogenic vials
- ▶ Cat. No. 430525 has a locking feature for use with all Corning self-standing vials

Cryogenic Vial Racks and Storage Boxes Ordering Information

Cat. No.	Description	Qty/Pk	Qty/Cs
CLS430525	Polycarbonate rack and tray, holds 30 vials; self-locking design in ice/water bath	1	1
CLS430526	Polycarbonate rack only, holds 30 vials; self-locking design	1	1
CLS431131	Reusable orange polypropylene vial rack, holds 50 vials; self-locking design	2	2
CLS431119	81 count (9 x 9 array) Cryogenic Box, for 1-2 mL vials	5	10
CLS431120	81 count (9 x 9 array) Cryogenic Box, for 4-5 mL vials	5	10
CLS431121*	100 count (10 x 10 array) Cryogenic Box, for 1-2 mL vials	5	10

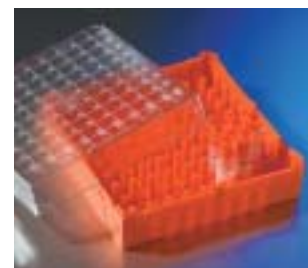
*431121 accepts internally threaded cryogenic vials only.



431119 Cryogenic Storage Box



431120 Cryogenic Storage Box



431121 Cryogenic Storage Box

Centrifuge Tubes



15 mL Centrifuge Tube

15 mL Centrifuge Tubes

- ▶ Corning® 15 mL centrifuge tubes feature black printed graduations and a large white marking spot.
- ▶ Tubes are available with your choice of cap styles; the original plug seal or flat cap. Both provide a tight, secure seal.
- ▶ Tubes are available in racks or bulk packed and are sterile and certified nonpyrogenic.

Centrifuge Tubes Ordering Information

Cat. No.	Material	Cap Style	Max. RCF	Qty/Pk	Qty/Cs
CLS430053	PET	Plug Seal	3,600	25/Sleeve	500
CLS430055	PET	Plug Seal	3,600	50/Rack	500
CLS430788	PET	Flat Top	3,600	50/Rack	500
CLS430789	PET	Flat Top	3,600	25/Sleeve	500
CLS430052	PP	Plug Seal	8,400	50/Rack	500
CLS430766	PP	Plug Seal	8,400	25/Sleeve	500
CLS430790	PP	Flat Top	8,400	50/Rack	500
CLS430791	PP	Flat Top	8,400	25/Sleeve	500

PP = Polypropylene, PET = Polyethylene Terephthalate, RCF = Relative Centrifugal Force (x g).

50 mL Centrifuge Tubes

- ▶ Corning 50 mL centrifuge tubes feature black printed graduations and a large white marking spot.
- ▶ These tubes are available with your choice of cap styles; the original plug seal or flat cap. Both provide a tight, secure seal.
- ▶ Tubes are available in racks or bulk packed and are sterile and certified nonpyrogenic.

50 mL Centrifuge Tubes Ordering Information

Cat. No.	Material	Cap Style	Max. RCF	Qty/Pk	Qty/Cs
CLS430290	PP	Plug Seal	9,400	25/Rack	500
CLS430291	PP	Plug Seal	9,400	25/Sleeve	500
CLS430304	PET	Plug Seal	3,600	25/Rack	500
CLS430828	PP	Flat Top	9,400	25/Rack	500
CLS430829	PP	Flat Top	9,400	25/Sleeve	500

PP = Polypropylene, PET = Polyethylene Terephthalate, RCF = Relative Centrifugal Force (x g).

Self-Standing 50 mL Centrifuge Tubes

- ▶ All Corning® 50 mL centrifuge tubes feature black printed graduations and a large white marking spot.
- ▶ Tubes are available with your choice of cap styles; the original plug seal or flat cap. Both provide a tight, secure seal.
- ▶ Tubes are bulk packed and are sterile and certified nonpyrogenic.

Self-Standing 50 mL Centrifuge Tubes Ordering Information

Cat. No.	Material	Cap Style	Max. RCF	Qty/Pk	Qty/Cs
CLS430897	PP	Plug Seal	3,000	25	500
CLS430921	PP	Flat Top	3,000	25	500

PP = Polypropylene, RCF = Relative Centrifugal Force (x g).



Self Standing 50 mL Centrifuge Tube



500 and 250 mL Centrifuge Tubes

250 mL and 500 mL Centrifuge Tubes and Support Cushions

- ▶ Corning 250 mL and 500 mL polypropylene tubes are ideal for applications requiring large-volume centrifugation.
- ▶ Each case of tubes contains a rack to facilitate handling.
- ▶ Support cushions must be used with this product unless the rotor has appropriately shaped V-bottom holders.
- ▶ Tubes are sterile and certified nonpyrogenic.

250 mL and 500 mL Centrifuge Tubes Ordering Information

Cat. No.	Description	Material	Cap Style	Max RCF	Qty/Pk	Qty/Cs
CLS430776	250 mL Tube	PP	Plug	6000	6	102
CLS430236	250 mL Support Cushion	PEI	n/a	n/a	n/a	6
CLS431123	500 mL Tube	PP	Plug	6000	6	36
CLS431124	500 mL Support Cushion	PEI	n/a	n/a	n/a	6

PP = Polypropylene, PEI = Polyetherimide, RCF = Relative Centrifugal Force (x g).

Technical Appendix

CHARACTERISTICS OF CORNING PLASTICWARE

		Polystyrene	Polyethylene (High Density)	Polypropylene	Polycarbonate	Nylon	P.T.F.E. (Teflon®)
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
	Clarity	Clear	Opaque	Translucent	Clear	Opaque	Opaque
	Autoclave Results	Melts	May distort	Withstands several cycles	Withstands one cycle	OK	OK
	Heat Distortion Point	147-175°F 64-80°C	250°F 121°C	275°F 135°C	280-290°F 138-143°C	300-356°F 150-180°C	250°F 121°C
	Burning Rate	Slow	Slow	Slow	Self-extinguishing	Self-extinguishing	None
Effects of Laboratory Reagents	Weak Acids	None	None	None	None	None	None
	Strong Acids	Oxidizing acids attack	Oxidizing acids attack	Oxidizing acids attack	May be attacked	Attacked	None
	Weak Alkalies	None	None	None	None	None	None
	Strong Alkalies	None	None	None	Slowly attacked	None	None
	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
Gas Permeability of Thin Wall Products*	O ₂	Low	High	High	Very low	Very low	–
	N ₂	Very low	Low	Low	Very low	Very low	–
	CO ₂	High	Very high	Very high	Low	–	–

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.

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

CHEMICAL COMPATIBILITY OF CORNING® PLASTICWARE

	PS	PP	PVC	CA	PC	CN	NY	MCE	PTFE	PET
Acids										
Hydrochloric acid (25%)	G	G	G	N	R	R	N	O	R	R
Hydrochloric acid (concentrated)	F	G	F	N	R	N	N	N	R	O
Nitric acid (concentrated)	P	P	P	N	R	N	N	N	O	N
Nitric acid (25%)	P	G	F	N	R	L	N	O	R	R
Alcohols										
Butanol	G	G	G	R	R	R	R	R	R	R
Ethanol	G	G	G	R	R	N	R	O	R	R
Methanol	G	G	G	R	R	N	R	O	R	R
Aniline										
Aniline	G	G	P	N	N	R	R	N	R	O
Dimethylformamide	P	G	F	N	N	N	R	N	R	N
Bases										
Ammonium hydroxide (25%)	F	G	G	R	N	R	R	O	N	O
Ammonium hydroxide (1N)	F	G	G	N	N	R	R	O	N	N
Sodium hydroxide	G	G	G	N	N	N	R	N	R	N
Hydrocarbons										
Hexane	P	G	F	R	R	R	R	R	R	R
Toluene	P	G	P	R	O	R	R	R	R	N
Xylene	P	F	P	R	R	R	R	R	R	N
Dioxane	P	G	P	N	N	N	R	N	R	R
Dimethylsulfoxide (DMSO)	P	G	P	N	N	N	R	N	R	O*
Halogenated Hydrocarbons										
Chloroform	P	G	P	N	N	R	R	N	R	R
Methylene chloride	P	F	P	N	N	R	R	N	R	N
Ketones										
Acetone	P	G	P	N	O	N	R	N	R	R
Methyl ethyl diketone	P	G	P	N	O	N	R	O	R	R

*Can be used with aqueous solutions containing up to 20% DMSO.

R = Recommended, L = Limited Resistance, N = Not Recommended, O = Testing Advised, F = Fair, G = Good, P = Poor, PP = Polypropylene, PVC = Polyvinyl Chloride, CA = Cellulose Acetate, PC = Polycarbonate, PTFE = Polytetrafluoroethylene PS = Polystyrene, CN = Cellulose Nitrate, NY = Nylon, MCE = Mixed Cellulose Esters, PET = Polyethylene Terephthalate.

CHARACTERISTICS OF CORNING CENTRIFUGE TUBES

The following information is provided to serve as a general guideline for determining suitability of Corning centrifuge tubes for your applications. In addition, Corning recommends following the procedures outlined by the centrifuge manufacturer, as well as conducting a trial run to determine proper conditions before beginning any critical applications.

Corning centrifuge tubes are tested for leakage. They should not break or leak if used in a properly balanced rotor with suitable carriers, holders, and adapters that fully support the tubes when run in accordance with the guidelines in this section. These tubes are intended for one-time use only; reuse is not recommended as breakage or leakage may occur.

The recommended working temperature range for Corning centrifuge tubes is 0 to 40°C. The suitability of these tubes for storage below 0°C depends on both the solution and the

storage conditions. In general, the polypropylene and PET tubes are more resistant to stress at low temperatures than polystyrene. It is strongly recommended that a trial run be performed under actual conditions to test the suitability of the tubes for frozen storage.

Suggestions for Safe Centrifugation

- Caution:** When centrifuging pathogenic organisms, clinical specimens known or suspected of being infectious, or any other potentially biohazardous materials, approved safety containment systems should be used. Contact your centrifuge manufacturer for appropriate accessories or recommendations.
- Read protocols and instruction manuals carefully. Do not confuse speed or revolutions per minute (RPM) with relative centrifugal force (RCF). Instructions for centrifuging a sample at a given RPM and time are incomplete unless the rotor or radius is specified. Protocols should always state the time and RCF value for centrifuging a sample.

- Proper balancing and distribution of the load in a centrifuge is critical for optimum performance and to prevent damage to the tubes or centrifuge. Opposing buckets or loads should always be balanced within the range specified by the manufacturer. Tubes should always be distributed in the buckets with respect to the center of rotation as well as the pivotal axis of the bucket. Failure to do this may prevent the bucket from achieving a horizontal position during the centrifugation run. Uneven separations or tube failure may result.

These centrifuge tubes are intended for use by persons knowledgeable in safe laboratory practices. Failure can result from surface damage, exceeding the specified RCF values, using unsuitable support systems, improper temperatures, or incompatible chemicals.

The RCF ratings for Corning® disposable centrifuge tubes have been established at room temperature using tubes filled to nominal capacity with water and spun in a horizontal rotor

centrifuge for 5 minutes. The centrifuge must be equipped with the recommended carriers, adapters, and cushions that fully support the tubes. If an angle head rotor is used or proper support is not provided, RCF values will be lower. Use of liquid other than water may also lower RCF values. Please consult your centrifuge specifications and the nomogram table (page 32) to determine speeds at which maximum RCF is achieved.

Chemical Compatibility of Disposable Plastic Centrifuge Tubes

The mechanical strength, flexibility, color, weight and dimensional stability of all plastic centrifuge tubes are affected to varying degrees by the chemicals with which they come in contact. Specific operating conditions, especially temperature, RCF, rotor type, carrier design, and run length will also affect tube performance.

Physical Properties of Disposable Plastic Centrifuge Tubes

	Clear Polypropylene	Opaque Polypropylene	New Polyethylene Terephthalate
Recommended Working Temp*	0-40°	0-40°	0-40°
Heat Distortion Point	121°	121°	70°
Flexibility	Moderate	Moderate	Rigid
Transparency	Clear	Opaque	Clear
Maximum RCF:			
15 mL Tube	8,400 x g	–	3,600 x g
50 mL Tube	9,400 x g	–	3,600 x g
250 mL Tube	–	6,000 x g	–
500 mL Tube	–	6,000 x g	–

*At room temperature for 24 hours.

Chemical Resistance of Disposable Plastic Centrifuge Tubes*

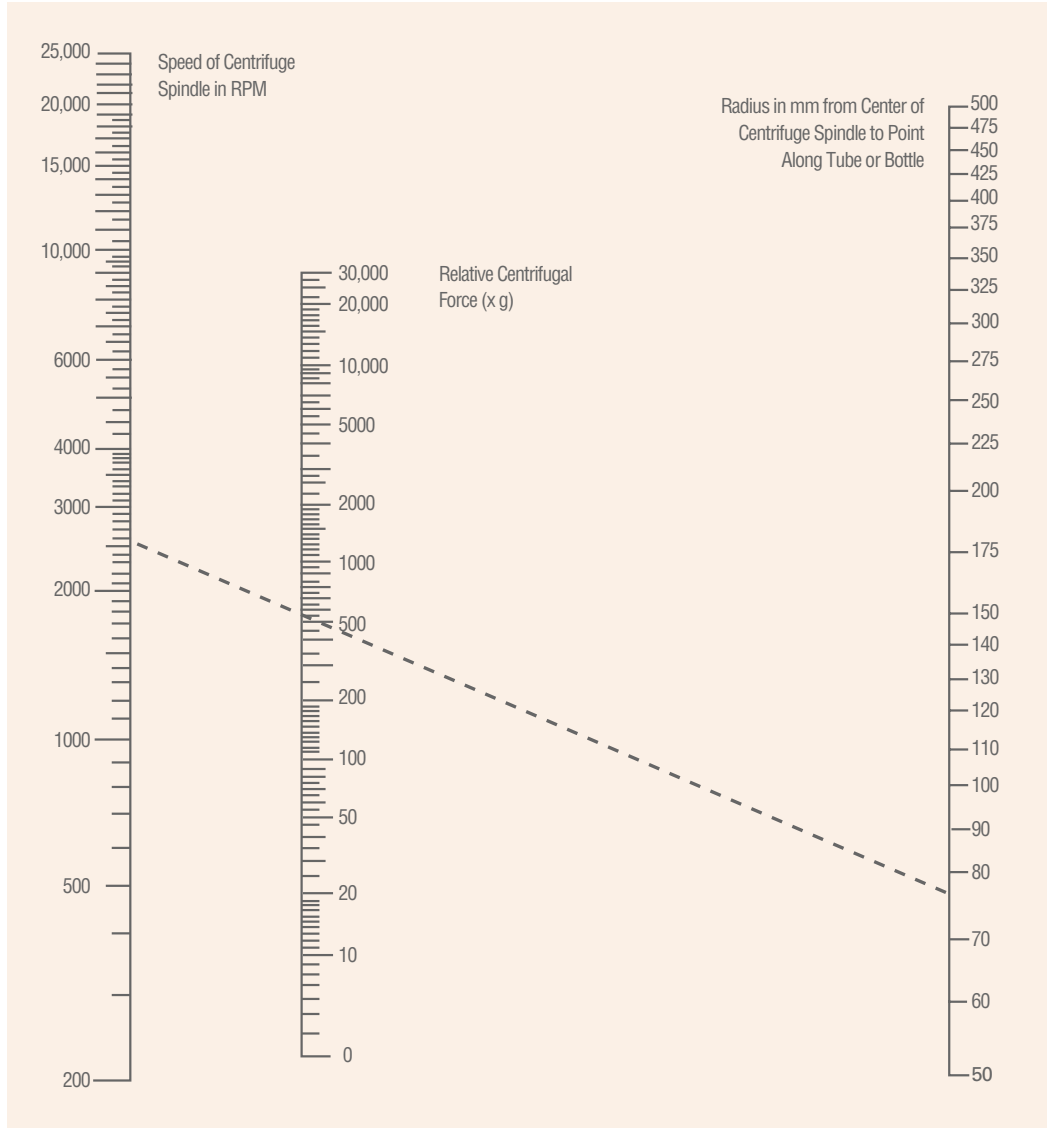
Chemical Class	Polyethylene Terephthalate	Polypropylene	Polyethylene Caps
Acids (weak)	1	1	1
Acids	3	1	1
Alcohols	1	1	1
Aldehydes	3 ^a	2 ^a	1
Bases	3	1	1
Esters	2	2	2
Hydrocarbons:			
Aliphatic	1	2	3
Aromatic	3	3 ^b	3
Halogenated	2	3	3
Ketones	2	2 ^c	2

*At room temperature for 24 hours.

1 = Recommended; 2 = Suitable for most applications. However, a trial run under specific operating conditions is recommended; 3 = Not recommended.

Note: a = Formaldehyde, rated 1; b = Phenol, rated 1; c = Acetone, rated 1.

Nomogram for Computing Relative Centrifugal Force



To calculate the RCF value at any point along the tube or bottle, measure the radius, in mm, from the center of the centrifuge spindle to the particular point. Draw a line from the radius value on the right hand column to the appropriate centrifuge speed on the left-hand column. The RCF value is the point where the line crosses the center column. The nomogram is based on the formula:

$$RCF = (11.17 \times 10^{-7}) RN^2$$

where:

R = Radius in mm from centrifuge spindle to point in tube bottom

N = Speed of spindle in RPM

CORNING® CELL CULTURE SURFACES

Introduction

For over eighty years Corning has been developing products and surfaces for cell culture. Corning currently offers five polystyrene-based surfaces (Table 1) for growing cells including the most recent technology revolution, the patented Corning CellBIND® surface (U.S. Patent 6,617,152):

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 (nonwetable) 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 References.

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 (see below) for use in situations where cell attachment must be kept to an absolute minimum.

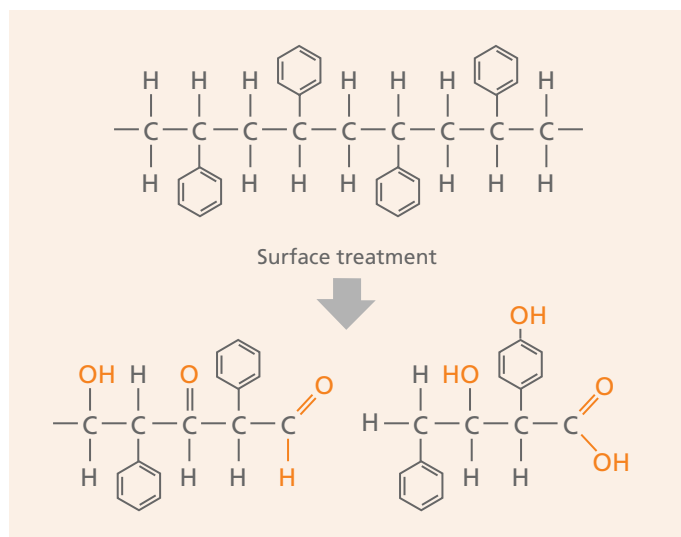


Figure 1. Polystyrene can be surface modified by the addition of a variety of different chemical groups, by breaking the carbon chain backbone, or by opening the benzene ring (not shown).

Ultra Low Attachment Coated Polystyrene Surface

The Corning 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 surfaces on dishes and microplates.

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 2). This surface has also been shown to inhibit the attachment and activation of macrophages and neutrophils.

Table 1. Corning Cell Culture Surfaces

Corning Surface	Binding Interaction	Sample Properties
Untreated polystyrene	Hydrophobic	Significantly reduces the attachment of most cells
Ultra Low Attachment coated polystyrene	Hydrophilic and nonionic	Hydrogel layer prevents the attachment of almost all cells
Tissue culture treated polystyrene	Hydrophilic and ionic (negatively charged)	Allows cell attachment and binding to polystyrene
Corning CellBIND modified polystyrene surface	Hydrophilic and ionic (negatively charged)	Improves cell attachment and binding to polystyrene
Poly-D-lysine coated polystyrene	Hydrophilic and ionic (positively charged)	Improves cell attachment and binding to polystyrene

Ultra Low Attachment 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)

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.

Corning CellBIND® Modified Polystyrene Surface

The Corning CellBIND culture surface, the first novel cell culture surface treatment in over 20 years, 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 (Figure 3). Developed by Corning scientists, this patented technology (U.S. Patent 6,617,152) uses a novel microwave plasma process for treating the culture surface. This process improves cell surface than traditional plasma or corona discharge treatments, rendering it more hydrophilic (wetter) and increasing the stability of the surface.

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. This enhanced cell performance has already led to a major biotechnology company choosing Corning roller bottles with the Corning CellBIND surface for producing a new FDA approved protein therapeutic.

Corning CellBIND surface benefits:

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

The Corning CellBIND surface is available on flasks, multiple well plates, CellSTACK Chambers and roller bottles.

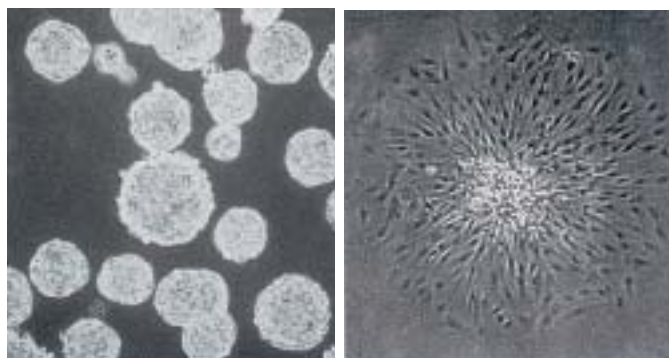


Figure 2. Single cell derived colonies of C6 glioma cells grow as flattened attached colonies in standard tissue culture treated surface (left panel) but form unattached spherical colonies on the ultra low attachment surface (right panel).

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 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 and 384 well microplates.

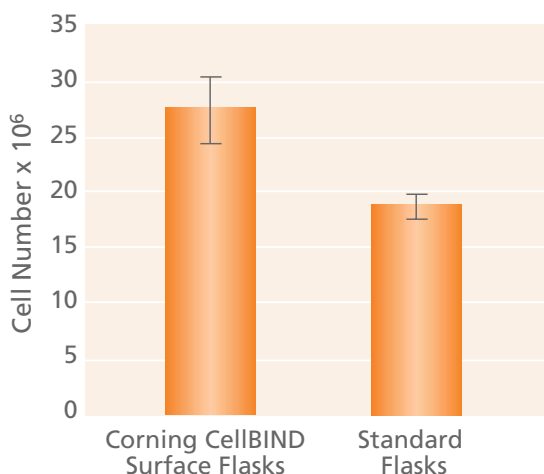


Figure 3. The first new cell culture treatment in over 20 years, the Corning CellBIND surface helps cells (such as the HEK-293 cells shown here) attach under difficult conditions and improves cell yields.