

# Surface Areas and Guide for Recommended Medium Volumes for Corning® Cell Culture Vessels

CORNING

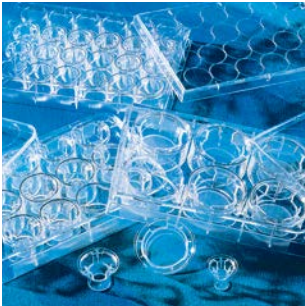
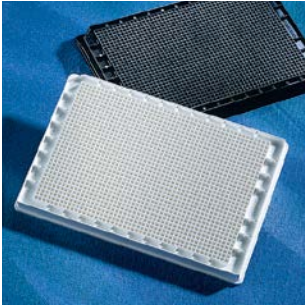
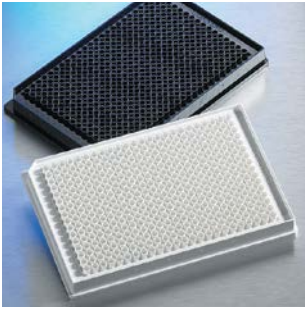
This guide gives the recommended medium volumes, approximate growth surface areas, and average cell yields for Corning disposable cell culture vessels.

Approximate growth surface areas are based on calculations made from engineering drawings. These calculations do not take into consideration minor variations that can occur in products during molding or the ability of many cell lines to grow up the sides of the vessels which can considerably increase the available surface area. For critical work, we suggest that you fix and stain cultures, and then carefully calculate the actual growth surface area.

In general, at least  $1 \times 10^5$  cells/cm<sup>2</sup> can be produced when growing cells as attached monolayers in culture. The average cell yields used here are based on this number. Actual cell yields can easily be several times higher or lower than this depending on the cell line and culture conditions.

Maintaining optimal cell to medium ratios is important for obtaining good cell growth. As a starting point, we recommend 0.2 to 0.3 mL medium for each square centimeter of culture vessel growth surface area; most of the recommended medium volume levels used in the tables below are based on this ratio. Medium volume recommendations for microplates and Transwell® inserts are higher due to meniscus effects associated with very small spaces and a higher rate of evaporation. Using more medium may reduce the need for feeding the cultures, but, due to the increased medium depth and the static nature of the environment, it will also slow the diffusion of oxygen to the cells.





## Corning® Microplates

Microplate	Well Diameter (Bottom) (mm)	Single Well Only			
		Approx. Growth Area (cm <sup>2</sup> )	Average Cell Yield	Total Well Volume (μL)	Working Volume (μL)
<b>Corning 96-well Microplates</b>					
Flat Bottom	6.4	0.32	3.2 x 10 <sup>4</sup>	360	100 - 200
Round Bottom	6.4	N/A**	N/A**	330	100 - 200
V-Bottom	6.4	0.38	3.8 x 10 <sup>4</sup>	320	100 - 200
Half Area	4.5	0.16	1.6 x 10 <sup>4</sup>	190	50 - 100
<b>Corning 384-well Microplates</b>					
Standard	2.7 x 2.7*	0.056	5.6 x 10 <sup>3</sup>	112	25 - 50
Low Volume	2.0	0.031	3.1 x 10 <sup>3</sup>	50	5 - 40
<b>Corning 1536-well Microplates</b>					
Low Volume	1.2	0.011	1.2 x 10 <sup>3</sup>	2.3	1 - 1.5
Clear Flat Bottom	1.63*	0.025	2.5 x 10 <sup>3</sup>	12.5	5 - 10
Solid Flat Bottom	1.53*	0.023	2.3 x 10 <sup>3</sup>	12.5	5 - 10

\*Square wells.

\*\*Because these wells are round, the surface area available for cell attachment is dependent on the medium volume used.

## Corning Multiple Well Plates

Plate	Well Diameter (Bottom) (mm)	Single Well Only			
		Approx. Growth Area (cm <sup>2</sup> )	Average Cell Yield	Total Well Volume (mL)	Working Volume (mL)
6-well	34.8	9.5	9.5 x 10 <sup>5</sup>	16.8	1.9 - 2.9
12-well	22.1	3.8	3.8 x 10 <sup>5</sup>	6.9	0.76 - 1.14
24-well	15.6	1.9	1.9 x 10 <sup>5</sup>	3.4	0.38 - 0.57
48-well	11.0	0.95	9.5 x 10 <sup>4</sup>	1.6	0.19 - 0.285

## Transwell® Permeable Supports

Transwell Insert Format	Transwell Insert Diameter (mm)	Approx. Growth Area (cm <sup>2</sup> )	Average Cell Yield	Recommended Volume (mL)	
				Well	Insert
6-well	24 mm	4.67 cm <sup>2</sup>	4.67 x 10 <sup>5</sup>	2.6	1.5
12-well	12 mm	1.12 cm <sup>2</sup>	1.12 x 10 <sup>5</sup>	1.5	0.5
24-well	6.5 mm	0.33 cm <sup>2</sup>	3.3 x 10 <sup>4</sup>	0.6	0.1
96-well	4.26 mm	0.143 cm <sup>2</sup>	1.4 x 10 <sup>4</sup>	0.235	0.075
100 mm dish	75 mm	44 cm <sup>2</sup>	4.4 x 10 <sup>6</sup>	13.0	9.0

## Corning Dishes

Dish	Approx. Growth Area (cm <sup>2</sup> )	Average Cell Yield	Recommended Volume (mL)
35 mm*	9	9.0 x 10 <sup>5</sup>	1.8 - 2.7
60 mm*	21	2.1 x 10 <sup>6</sup>	4.2 - 6.3
100 mm*	55	5.5 x 10 <sup>6</sup>	11 - 16.5
150 mm*	152	1.52 x 10 <sup>7</sup>	30.4 - 45.6
245 mm†	500	5.0 x 10 <sup>7</sup>	100 - 150

\*Not actual bottom diameters.

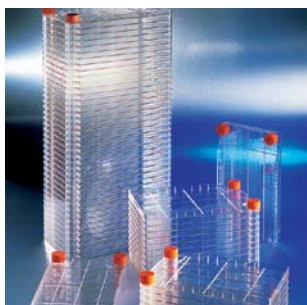
†Dish is square.



### Corning® Flasks\*\*\*

Flask	Approx. Growth Area (cm <sup>2</sup> )	Average Cell Yield	Recommended Medium Volume (mL)	Approx. Total Flask Volume (mL)
25 cm <sup>2</sup>	25	2.5 x 10 <sup>6</sup>	5 - 7.5	70 rectangular
75 cm <sup>2</sup>	75	7.5 x 10 <sup>6</sup>	15 - 22.5	265 U-shaped
150 cm <sup>2</sup>	150	1.5 x 10 <sup>7</sup>	30 - 45	377 U-shaped
175 cm <sup>2</sup>	175	1.75 x 10 <sup>7</sup>	35 - 52.5	513 U-shaped
225 cm <sup>2</sup>	225	2.25 x 10 <sup>7</sup>	45 - 67.5	1,006 traditional
Corning HYPERFlask®	1,720	1.72 x 10 <sup>8</sup>	560 - 565	560 - 565

\*\*\*Corning flasks (larger than 100 cm<sup>2</sup>) are considered US Class I medical devices.



### Corning Stacked Chambers\*\*\*

Chamber Size	Approximate Growth Area (cm <sup>2</sup> )	Average Cell Yield	Recommended Medium Volume (mL)
<b>Corning CellSTACK® Chambers</b>			
1-stack	636	6.36 x 10 <sup>7</sup>	127 - 191
2-stack	1,272	1.27 x 10 <sup>8</sup>	254 - 382
5-stack	3,180	3.18 x 10 <sup>8</sup>	636 - 954
10-stack	6,360	6.36 x 10 <sup>8</sup>	1,272 - 1,908
40-stack	25,440	2.54 x 10 <sup>9</sup>	5,088 - 7,632

#### Corning HYPERStack® Chambers

12-stack	6,000	6.0 x 10 <sup>8</sup>	1,300
36-stack	18,000	1.8 x 10 <sup>9</sup>	3,900

\*\*\*Corning stacked chambers are considered US Class I medical devices.



### Corning Roller Bottles\*\*\*

Roller Bottle	Approximate Growth Area (cm <sup>2</sup> )	Average Cell Yield	Recommended Medium Volume (mL)
490 cm <sup>2</sup>	490	4.9 x 10 <sup>7</sup>	100 - 150
850 cm <sup>2</sup>	850	8.5 x 10 <sup>7</sup>	170 - 255
1,700 cm <sup>2</sup> ESRB	1,700	1.7 x 10 <sup>8</sup>	340 - 510
1,750 cm <sup>2</sup>	1,750	1.75 x 10 <sup>8</sup>	350 - 525

\*\*\*Corning roller bottles are considered US Class I medical devices.



### Corning CellCube® Systems\*\*\*

CellCube Module	Approximate Growth Area (cm <sup>2</sup> )	Average Cell Yield	Recommended Medium Volume (mL)
10-stack	8,500	8.5 x 10 <sup>8</sup>	N/A*
25-stack	21,250	2.13 x 10 <sup>9</sup>	N/A*
50-stack	42,500	4.25 x 10 <sup>9</sup>	N/A*
100-stack	85,000	8.5 x 10 <sup>9</sup>	N/A*

\*Not applicable; these systems are perfused with medium from a reservoir.

\*\*\*Corning CellCube systems are considered US Class I medical devices.



# CORNING

## Corning Incorporated Life Sciences

836 North St.  
Building 300, Suite 3401  
Tewksbury, MA 01876  
t 800.492.1110  
t 978.442.2200  
f 978.442.2476

[www.corning.com/lifesciences](http://www.corning.com/lifesciences)

### ASIA/PACIFIC

**Australia/New Zealand**  
t 61 427286832

**Chinese Mainland**  
t 86 21 3338 4338  
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t 91 124 4604000  
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t 82 2-796-9500  
f 82 2-796-9300

### Singapore

t 65 6572-9740  
f 65 6735-2913

### Taiwan

t 886 2-2716-0338  
f 886 2-2516-7500

### EUROPE

[CEurope@corning.com](mailto:CEurope@corning.com)

### France

t 0800 916 882  
f 0800 918 636

### Germany

t 0800 101 1153  
f 0800 101 2427

### The Netherlands

t 020 655 79 28  
f 020 659 76 73

### United Kingdom

t 0800 376 8660  
f 0800 279 1117

### All Other European Countries

t +31 (0) 206 59 60 51  
f +31 (0) 206 59 76 73

### LATIN AMERICA

[grupoLA@corning.com](mailto:grupoLA@corning.com)

### Brazil

t 55 (11) 3089-7400

### Mexico

t (52-81) 8158-8400

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