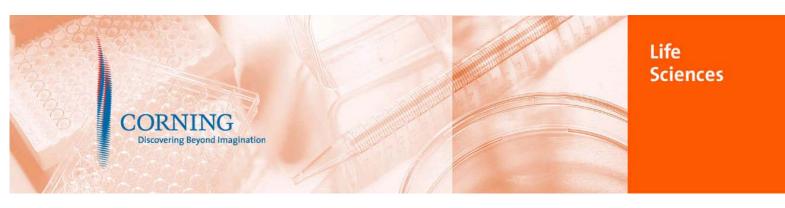
# Surface Areas and Recommended Medium Volumes for Corning<sup>®</sup> Cell Culture Vessels



#### Introduction

This guide gives the recommended medium volumes, approximate growth surface areas and average cell yields for Corning plastic 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 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 0.2mL to 0.3mL 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<sup>®</sup> inserts are higher due to meniscus effects associated with very small spaces. 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.

#### **Microplates**

Corning <sup>®</sup>	Well	Single Well Only					
1536 Well Plates	Diameter (Bottom - mm)	Approx. Growth Area (cm <sup>2</sup> )	Average Cell Yield	Total Well Volume (μL)	Working Volume (µL)		
Low volume	1.2	0.011	1.2 x 10 <sup>3</sup>	2.3	1 – 1.5		
Clear flat bottom	1.63 x 1.63*	0.025	2.5 x 10 <sup>3</sup>	12.5	5 – 10		
Solid flat bottom	1.53 x 1.53*	0.023	2.3 x 10 <sup>3</sup>	12.5	5 – 10		

\*These wells are square.

Corning	Well	Single Well Only				
384 Well Plates	Diameter (Bottom - mm)	Approx. Growth Area (cm <sup>2</sup> )	Average Cell Yield	Total Well Volume (μL)	Working Volume (µL)	
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	

\*These wells are square.

Corning	Well	Single Well Only				
96 Well Plates	Diameter (Bottom - mm)	Approx. Growth Area (cm <sup>2</sup> )	Average Cell Yield	Total Well Volume (μL)	Working Volume (µL)	
Flat bottom	6.4	0.32	3.2 x 10 <sup>4</sup>	360	100 – 200	
Round bottom	6.4	NA*	NA*	330	100 – 200	
V bottom	6.4	0.38	3.8 x 10 <sup>4</sup>	320	100 – 200	
½ area	4.5	0.16	1.6 x 10 <sup>4</sup>	190	50 – 100	

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

### **Multiple Well Plates**

Corning	Well		Single V	Vell Only		
Multiple Well Plates	Diameter (Bottom - mm)	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 10⁵	16.8	1.9 – 2.9	
12 well	22.1	3.8	3.8 x 10⁵	6.9	0.76 – 1.14	
24 well	15.6	1.9	1.9 x 10⁵	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®	Transwell Insert	Approximate Growth Area		ert Growth Area Average V			nmended ne (mL)
Insert Format	diameter	(cm²)	Cell Yield	Well	Insert		
96 well	4.26mm	0.143cm <sup>2</sup>	1.4 x 10 <sup>4</sup>	0.235	0.075		
24 well	6.5mm	0.33cm <sup>2</sup>	3.3 x 10 <sup>4</sup>	0.6	0.1		
12 well	12mm	1.12cm <sup>2</sup>	1.12 x 10 <sup>5</sup>	1.5	0.5		
6 well	24mm	4.67cm <sup>2</sup>	4.67 x 10 <sup>5</sup>	2.6	1.5		
100mm dish	75mm	44cm <sup>2</sup>	4.4 x 10 <sup>6</sup>	13.0	9.0		

#### **Transwell Permeable Supports**

#### **Dishes**

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

\*Not actual bottom diameters. <sup>†</sup>Dish is square

#### Flasks

Corning Flasks	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	50 triangular, 70 rectangular
75 cm <sup>2</sup>	75	7.5 x 10 <sup>6</sup>	15 – 22.5	290 rectangular, 300 triangular
RoboFlask™	92.6	9.26 x 10 <sup>6</sup>	18 – 27	116
Low profile	100	1.0 x 10 <sup>7</sup>	20 - 30	225
150 cm <sup>2</sup>	150	1.5 x 10 <sup>7</sup>	30 – 45	600
162 cm <sup>2</sup>	162	1.6 x 10 <sup>7</sup>	32 – 48	720
175 cm <sup>2</sup>	175	1.75 x 10 <sup>7</sup>	35 – 52.5	790
225 cm <sup>2</sup>	225	2.25 x 10 <sup>7</sup>	45 – 67.5	900 rectangular, 1000 traditional
235 cm <sup>2</sup>	235	2.35 x 10 <sup>7</sup>	47 – 70.5	900
HYPER <i>Flask<sup>®</sup></i>	1720	1.72 x 10 <sup>8</sup>	560 - 565	560 - 565

## CellSTACK<sup>®</sup> Chambers

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

#### **Roller Bottles**

Corning Roller Bottles	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
1700 cm <sup>2</sup> ESRB	1,700	1.7 x 10 <sup>8</sup>	340 – 510
1750 cm <sup>2</sup>	1,750	1.75 x 10 <sup>8</sup>	350 – 525

### CellCube<sup>®</sup> Systems

Corning <sup>®</sup> CellCube Modules	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>	NA*
25 Stack	21,250	2.13 x 10 <sup>9</sup>	NA*
50 Stack	42,500	4.25 x 10 <sup>9</sup>	NA*
100 Stack	85,000	8.5 x 10 <sup>9</sup>	NA*

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

For additional product or technical information, please e-mail us at CLStechserv@corning.com, visit our web site <u>www.corning.com/lifesciences</u> or call 1-800-492-1110. Outside the United States call 978-635-2200.

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