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

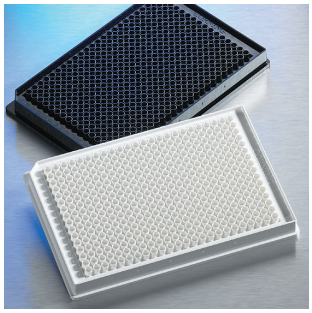
CORNING

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 x 10^5 cells/cm^2 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.

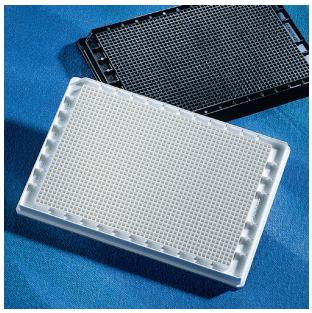
Maintaining optimal cell to medium ratios is important for obtaining good cell growth. As a starting point, we recommend 0.2 to 0.3 mL medium for each square centimeter of culture vessel growth surface area; most of the recommended medium volume levels used in the tables below are based on this ratio. 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^2)	Single Well Only: Average Cell Yield	Single Well Only: Total Well Volume (µL)	Single Well Only: Working Volume (µL)
96-well Microplates					
Flat Bottom	6.4	0.32	3.2×10^4	360	100 - 200
Round Bottom	6.4	N/A**	N/A**	330	100 - 200
V-Bottom	6.4	0.38	3.8×10^4	320	100 - 200
Half Area	4.5	0.16	1.6×10^4	190	50 - 100
384-well Microplates					
Standard	2.7 x 2.7*	0.056	5.6×10^3	112	25 - 50
Low Volume	2.0	0.031	3.1×10^3	50	5 - 40
1536-well Microplates					
Clear Flat Bottom	1.63*	0.025	2.5×10^3	12.5	5 - 10
Solid Flat Bottom	1.53*	0.023	2.3×10^3	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 Multiwell Plates

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

Transwell® Permeable Supports

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

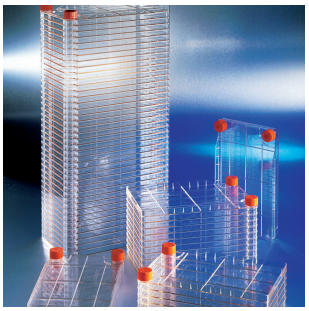
Corning Dishes

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

*Not actual bottom diameters.
†Dish is square.

Corning® Flasks

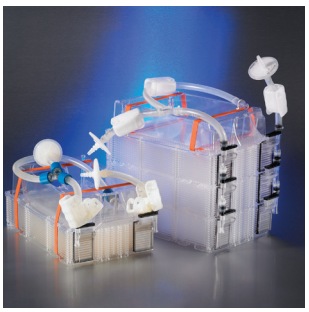
Flask	Approx. Growth Area (cm^2)	Average Cell Yield	Recommended Medium Volume (mL)	Approx. Total Flask Volume (mL)
25 cm^2	25	2.5 x 10^6	5 - 7.5	70 rectangular
75 cm^2	75	7.5 x 10^6	15 - 22.5	265 U-shaped
150 cm^2	150	1.5 x 10^7	30 - 45	377 U-shaped
175 cm^2	175	1.75 x 10^7	35 - 52.5	513 U-shaped
225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



Corning Stacked Chambers

Corning CellSTACK® Chambers

Chamber Size	Approximate Growth Area (cm^2)	Average Cell Yield	Recommended Medium Volume (mL)
1-stack	636	6.36 x 10^7	127 - 191
2-stack	1,272	1.27 x 10^8	254 - 382
5-stack	3,180	3.18 x 10^8	636 - 954
10-stack	6,360	6.36 x 10^8	1,272 - 1,908
40-stack	25,440	2.54 x 10^9	5,088 - 7,632
Corning HYPERStack® Chambers			
12-stack	6,000	6.0 x 10^8	1,300
36-stack	18,000	1.8 x 10^9	3,900



Corning Roller Bottles

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

Corning CellCube® Systems

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

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

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