How to calculate cable fill rates

To correctly calculate cable fill rates requires knowing the circular area of the cables and factoring in the fill ratio.

Fill ratio:
The actual area of cable space to be filled needs to be reduced to 50-60% for data cables, and ~30% for larger power cords.
Cables are round and don't lay straight. This factors in that extra space. These estimates have been tested and are accurate.
For data cables in a small space the fill ratio is closer to 60%. As the space increases the fill ratio is closer to 50%.
As this table with data cables demonstrates, the larger cable managers were calculated at 55% and the smaller ones at 60%.
Capacities provided reflect optimized cable routing and can be adversely affected by poor cable routing practices.

These charts show the fill rates of our vertical and horizontal cable managers for many common networking cables.
The top grey area that references cable diameter and cable area has the 'circular area' formula in the cable area cells.
circular area = ((cable diameter)^2 x 3.14)/4

English Units

Cable Type	Fiber	CAT 5e			CAT6a
Cable Diam. (in)	0.12	0.23	0.25	0.29	0.31
Cable Area (in)	0.01	0.04	0.05	0.07	0.08

Vertical Cable Mgrs	Description	Height (in)	Width (in)	Cross-Sec (sq in)	Fill Ratio	Fiber	CAT 5e			CAT6a
Misc. Mounting										
AR8621	Toolless Hook-and-Loop	Circular Bundle		16.0	60%	849	231	196	145	127
AR7540 / AR7540100	Toolless Plastic Ring 10 or 100 pk	1.3	3.5	4.7	60%	247	67	57	42	37
AR7707	Metal Ring 8" Depth	2.3	7.4	16.6	60%	881	240	203	151	132

AR8113A (small cable rings)	Cable Ring 1U Height	1.5	2.5	3.8	60%	199	54	46	34	30
AR8113A (med. cable rings)	Cable Ring 2U Height	2.8	2.5	6.9	60%	365	99	84	62	55
AR8443A	Fiber Spool Organizer (4 spools)	1.5	3.7	5.4	60%	288	78	66	49	43
AR8444	Fiber Spools (4 spools)	1.5	3.7	5.4	60%	288	78	66	49	43
AR8654	Fiber Cable Fall for NetShelter Roof Openings / Open Frame Rack & Vert Mgrs	1.5	3.7	5.4	60%	288	78	66	49	43
Only within Cabinets										
AR8442	Vertical, 8 Ring, Toolless	1.5	2.5	3.8	60%	199	54	46	34	30
AR7710	Containment Bracket with PDU mount	1.5	4.3	6.4	60%	338	92	78	58	51
AR7721	42U,Vertical, Plastic Guides, Toolless for 24in W SX	4.0	1.2	4.7	60%	251	68	58	43	38
AR7722	45U,Vertical, Plastic Guides, Toolless for 24in W SX	4.0	1.2	4.7	60%	251	68	58	43	38
AR7723	48U,Vertical, Plastic Guides, Toolless for 24in W SX	4.0	1.2	4.7	60%	251	68	58	43	38
AR7580A	42U,Vertical, Plastic Guides, for 30in W SX (AR3x50)	6.3	3.8	23.9	60%	1271	346	293	218	190
AR7585	45U,Vertical, Plastic Guides, for 30in W SX (AR3x55)	6.3	3.8	23.9	60%	1271	346	293	218	190
AR7588	48U,Vertical, Plastic Guides, for 30in W SX (AR3x58)	6.3	3.8	23.9	60%	1271	346	293	218	190
AR7717A	(preinstalled in AR3140/AR3340)	6.0	8.0	48.0	55%	2335	636	538	400	350
AR7737	(preinstalled in AR3347)	6.0	8.0	48.0	55%	2335	636	538	400	350

Open Frame Racks 2 & 4 Post

AR8615 (front)	Performance, Single-sided, 6" W	4.7	3.7	17.2	55%	838	228	193	144	126
AR8615 (rear)	Performance, Single-sided, 6" W	5.5	5.9	32.3	55%	1572	428	362	269	236
AR8625 (front and rear)	Performance, Double-sided, 6" W	9.3	7.4	68.9	55%	3354	913	773	574	503
AR8625 (middle)	Performance, Double-sided, 6" W	9.0	5.9	52.9	55%	2573	700	593	441	385
AR8635 (front)	Performance, Single-sided, 10" W	4.7	7.7	36.0	55%	1750	476	403	300	262
AR8635 (rear)	Performance, Single-sided, 10" W	5.5	9.9	54.3	55%	2643	719	609	452	396
AR8645 (front and rear)	Performance, Double-sided, 10" W	9.3	15.4	143.8	55%	6998	1905	1612	1198	1049
AR8645 (middle)	Performance, Double-sided, 10" W	9.0	9.9	88.9	55%	4324	1177	996	740	648
AR8665 (front)	Performance, Single-sided, 12" W	4.7	9.7	45.3	55%	2204	600	508	377	330
AR8665 (rear)	Performance, Single-sided, 12" W	5.5	11.9	65.3	55%	3178	865	732	544	476
AR8675 (front and rear)	Performance, Double-sided, 12" W	9.3	19.4	181.2	55%	8816	2400	2031	1510	1321
AR8675 (middle)	Performance, Double-sided, 12" W	9.0	11.9	106.9	55%	5200	1416	1198	890	779
AR8715 (front)	Valueline, Single-sided, 6" W, 84" H	6.1	5.0	30.5	55%	1482	403	341	254	222
AR8715 (rear with AR8736 installed)	Valueline, Single-sided, 6" W, 84" H	2.5	4.0	10.0	55%	487	132	112	83	73

AR8725 (front and rear)	Valueline, Double-sided, 6" W, 84" H	6.1	10.0	60.9	55%	2963	807	683	507	444
AR8728 (front)	Valueline, Single-sided, 6" W, 96" H	6.1	5.0	30.5	55%	1482	403	341	254	222
AR8728 (rear with AR8736 installed)	Valueline, Single-sided, 6" W, 96" H	2.5	4.0	10.0	55%	487	132	112	83	73
AR8765 (front)	Valueline, Single-sided, 12" W, 84" H	6.1	10.8	65.5	55%	3185	867	734	545	477
AR8765 (rear with AR8737 installed)	Valueline, Single-sided, 12" W, 84" H	2.5	10.0	25.0	55%	1216	331	280	208	182
AR8768 (front)	Valueline, Single-sided, 12" W, 96" H	6.1	10.8	65.5	55%	3185	867	734	545	477
AR8768 (rear with AR8737 installed)	Valueline, Single-sided, 12" W, 84" H	2.5	10.0	25.0	55%	1216	331	280	208	182
AR8775 (front and rear)	Valueline, Double-sided, 12" W, 84" H	6.1	21.5	130.9	55%	6371	1734	1468	1091	955
AR8440A	Valueline, Single-sided, 3" Wide (Phasing out Limited Quantites Avail.)	5.9	3.6	21.1	55%	1028	280	237	176	154
AR8441A	Valueline, Single-sided, 6" Wide (Phasing out Limited Quantites Avail.)	5.9	5.9	34.8	55%	1694	461	390	290	254
Troughs and Partitions/Overhead VED										
AR8561	Power Trough, 24in Wide (at deepest setting)	6.2	11.9	73.5	60%	3901	1062	899	668	584
AR8571	Power Trough, 30in Wide (at deepest setting)	6.2	11.9	73.5	60%	3901	1062	899	668	584

AR8560	Power Trough, 24in Wide (at deepest setting)	6.2	11.9	73.5	60%	3901	1062	899	668	584
AR8570	Power Trough, 30in Wide (at deepest setting)	6.2	11.9	73.5	60%	3901	1062	899	668	584
AR8580	Power Trough, 12in Wide (at deepest setting)	6.2	11.9	73.5	60%	3901	1062	899	668	584
AR8163ABLK	Data Partition, 24in Wide with pass-through hole	2.9	9.8	28.7	60%	1525	415	351	261	229
AR8173BLK	Data Partition, 30in Wide with pass-through hole	2.8	9.8	27.7	60%	1468	400	338	251	220
AR8183BLK	Data Partition, 30in Wide with pass-through hole	2.8	9.8	27.7	60%	1468	400	338	251	220
AR7751 - AR7754 (also W versions)	Vertical Exhaust Duct Kit (accessorize with AR8621 on left/right inside duct)	Circular Bundles (2)		32.0	60%	1699	462	391	291	255
AR7755 / AR7756 (also W versions)	Vertical Exhaust Duct Overhead Cable Extension (feed onto roof of cabinet)	5.1	6.7	34.2	60%	1814	494	418	311	272
Horizontal Cable Managers										
AR8428	Horizontal Cable Organizer 2U w/ pass through holes	2.8	2.5	6.9	60%	365	99	84	62	55
AR8425A	Horizontal Cable Organizer 1U	1.5	2.5	3.8	60%	199	54	46	34	30
AR8426A	Horizontal Cable Organizer 2U	2.8	2.5	6.9	60%	365	99	84	62	55
AR8427A	Horizontal Cable Organizer 2U with cable fingers	1.5	2.5	3.8	60%	199	54	46	34	30
AR8600A	Horizontal Cable Manager, 2U x 4" Deep, single-sided with Cover	3.5	2.6	9.2	60%	488	133	112	83	73
AR8602A	Horizontal Cable Manager, 1U x 4" Deep, single-sided with Cover	1.0	2.6	2.6	60%	139	38	32	24	21

AR8603A	Horizontal Cable Manager, 2U x 6" Deep, single-sided with Cover	5.8	3.0	17.3	60%	916	249	211	157	137
AR8605	Horizontal Cable Manager, 3U x 6" Deep, single-sided with Cover	5.8	4.1	23.7	60%	1259	343	290	216	189
AR8606	Horizontal Cable Manager, 2U x 6" Deep, single-sided with Cover	5.8	3.0	17.3	60%	916	249	211	157	137
AR8612	Horizontal Cable Manager, 1U x 6" Deep, single-sided with Cover	5.8	0.8	4.3	60%	229	62	53	39	34
AR7706	Mounting Rail Brush Strips, NetShelter SX, 750mm W (AR3x5x)	2.8	2.2	6.3	60%	336	92	78	58	50
AR8008BLK	Horizontal Cable Org.Side Channel 18 - 30" adjustment	2.3	1.6	3.8	60%	202	55	47	35	30
AR8016ABLK	Horizontal Cable Org. Side Channel 10" to 18" adjustment	2.3	1.6	3.8	60%	202	55	47	35	30
AR8429	Horizontal Cable Organizer 1U with Brush Strip	1.7	16.9	29.0	60%	1540	419	355	264	231
Pass-through Side Panels										
AR7305A	NetShelter SX 42U 1070mm Split Feed Through Side Panels Qty 2	25.6	5.7	144.8	60%	7688	2093	1771	1316	1152
AR7313	NetShelter SX 42U 1200mm Split Feed Through Side Panels Qty 2	25.6	5.7	144.8	60%	7688	2093	1771	1316	1152
AR7314	NetShelter SX 48U 1200mm Split Feed Through Side Panels Qty 2	25.6	5.7	144.8	60%	7688	2093	1771	1316	1152
AR7315	NetShelter SX 45U 1070mm Split Feed Through Side Panels Qty 2	25.6	5.7	144.8	60%	7688	2093	1771	1316	1152
AR7316	NetShelter SX 45U 1200mm Split Feed Through Side Panels Qty 2	25.6	5.7	144.8	60%	7688	2093	1771	1316	1152

AR7375	NetShelter SX 48U 1070mm Split Feed Through Side Panels Qty 2	25.6	5.7	144.8	60%	7688	2093	1771	1316	1152
Cabinets										
AR310x	Roof Brush Strip Openings (x5)	2.0	6.5	13.0	60%	690	188	159	118	103
AR315x	Roof Brush Strip Openings (x9)	2.0	6.5	13.0	60%	690	188	159	118	103
AR330x	Roof Brush Strip Openings (x9)	2.0	6.5	13.0	60%	690	188	159	118	103
AR335x	Roof Brush Strip Openings (x9)	2.0	6.5	13.0	60%	690	188	159	118	103
AR3140	Roof Brush Strip Openings (x2)	30.7	10.9	334.5	60%	17756	4833	4091	3040	2661
AR334x	Roof Brush Strip Openings (x2)	30.7	10.9	334.5	60%	17756	4833	4091	3040	2661
AR3x5x	Mounting rail pass-through holes	2.1	2.8	5.8	60%	310	84	71	53	46
AR3200	Cable Openings: (1) Top, (1) Bottom	2.6	4.8	12.2	60%	647	176	149	111	97
AR4018A / AR4018IA	Lower Cable Entry Port	14.0	3.4	48.0	60%	2545	693	586	436	381
AR4024A / AR4024IA	Lower Cable Entry Port	14.0	3.4	48.0	60%	2545	693	586	436	381
AR4038A / AR4038IA	Lower Cable Entry Port	14.0	3.4	48.0	60%	2545	693	586	436	381
AR4038A / AR4038IA	Upper Cable Entry Port	14.0	3.4	48.0	60%	2545	693	586	436	381

Metric Units

		Height (mm)	Width (mm)	Cross-sec (sq mm)	Fill Ratio	Fiber	CAT 5e			CAT6a
Cable Type						Fiber	CAT 5e			CAT6a
Cable Diameter (mm)						3.0	5.8	6.4	7.4	7.9
Cable Area (mm)						7.29	26.79	31.65	42.59	48.67
Vertical Cable Mgrs										
Misc. Mounting										
AR8621	Toolless Hook-and-Loop	Circular Bundle		10322	60%	849	231	196	145	127

AR7540 / AR7540100	Toolless Plastic Ring 10 or 100 pk	34	89	3003	60%	247	67	57	42	37
AR7707	Metal Ring 20cm Depth	57	187	10706	60%	881	240	203	151	132
AR8113A (small cable rings)	Cable Ring 1U Height	38	64	2419	60%	199	54	46	34	30
AR8113A (med. cable rings)	Cable Ring 2U Height	70	64	4435	60%	365	99	84	62	55
AR8443A	Fiber Spool Organizer (4 spools)	37	94	3500	60%	288	78	66	49	43
AR8444	Fiber Spools (4 spools)	37	94	3500	60%	288	78	66	49	43
AR8654	Fiber Cable Fall for NetShelter Roof Openings / Open Frame Rack & Vert Mgrs	37	94	3509	60%	289	79	67	49	43
Only within Cabinets										
AR8442	Vertical, 8 Ring, Toolless	38	64	2419	60%	199	54	46	34	30
AR7710	Containment Bracket with PDU mount	38	108	4113	60%	338	92	78	58	51
AR7721	42U,Vertical, Plastic Guides, Toolless for 600mm W SX	102	30	3045	60%	251	68	58	43	38
AR7722	45U,Vertical, Plastic Guides, Toolless for 600mm W SX	102	30	3045	60%	251	68	58	43	38
AR7723	48U,Vertical, Plastic Guides, Toolless for 600mm W SX	102	30	3045	60%	251	68	58	43	38
AR7580A	42U,Vertical, Plastic Guides, for 750mm W SX (AR3x50)	160	97	15445	60%	1271	346	293	218	190
AR7585	45U,Vertical, Plastic Guides, for 750mm W SX (AR3x55)	160	97	15445	60%	1271	346	293	218	190

AR7588	48U,Vertical, Plastic Guides, for 750mm W SX (AR3x58)	160	97	15445	60%	1271	346	293	218	190
AR7717A	(preinstalled in AR3140/AR3340)	152.4	203.2	30967.7	55%	2335	636	538	400	350
AR7737	(preinstalled in AR3347)	152.4	203.2	30967.7	55%	2335	636	538	400	350
Open Frame Racks 2 & 4 Post										
AR8615 (front)	Performance, Single-sided, 152mm W	119	94	11118	55%	838	228	193	144	126
AR8615 (rear)	Performance, Single-sided, 152mm W	140	149	20847	55%	1572	428	362	269	236
AR8625 (front and rear)	Performance, Double-sided,152mm W	237	187	44470	55%	3354	913	773	574	503
AR8625 (middle)	Performance, Double-sided,152mm W	229	149	34113	55%	2573	700	593	441	385
AR8635 (front)	Performance, Single-sided, 254mm W	119	196	23200	55%	1750	476	403	300	262
AR8635 (rear)	Performance, Single-sided, 254mm W	140	251	35041	55%	2643	719	609	452	396
AR8645 (front and rear)	Performance, Double-sided, 254mm W	237	391	92799	55%	6999	1905	1612	1198	1049
AR8645 (middle)	Performance, Double-sided, 254mm W	229	251	57340	55%	4324	1177	996	740	648
AR8665 (front)	Performance, Single-sided, 304mm W	119	246	29226	55%	2204	600	508	377	330
AR8665 (rear)	Performance, Single-sided, 304mm W	140	302	42137	55%	3178	865	732	544	476
AR8675 (front and rear)	Performance, Double-sided, 304mm W	237	493	116902	55%	8816	2400	2031	1510	1321
AR8675 (middle)	Performance, Double-sided, 304mm W	229	302	68951	55%	5200	1416	1198	890	779

AR8715 (front)	Valueline, Single-sided, 152mm W, 2.1m H	155	127	19646	55%	1482	403	341	254	222
AR8715 (rear with AR8736 installed)	Valueline, Single-sided, 152mm W, 2.1m H	64	102	6452	55%	487	132	112	83	73
AR8725 (front and rear)	Valueline, Double-sided, 152mm W, 2.1m H	155	254	39291	55%	2963	807	683	507	444
AR8728 (front)	Valueline, Single-sided, 152mm W, 2.4m H	155	127	19646	55%	1482	403	341	254	222
AR8728 (rear with AR8736 installed)	Valueline, Single-sided, 152mm W, 2.4m H	64	102	6452	55%	487	132	112	83	73
AR8765 (front)	Valueline, Single-sided, 304mm W, 2.1m H	155	273	42238	55%	3185	867	734	545	477
AR8765 (rear with AR8737 installed)	Valueline, Single-sided, 304mm W, 2.1m H	64	254	16129	55%	1216	331	280	208	182
AR8768 (front)	Valueline, Single-sided, 304mm W, 2.4m H	155	273	42238	55%	3185	867	734	545	477
AR8768 (rear with AR8737 installed)	Valueline, Single-sided, 304mm W, 2.1m H	64	254	16129	55%	1216	331	280	208	182
AR8775 (front and rear)	Valueline, Double-sided, 304mm W, 2.1m H	155	546	84476	55%	6371	1734	1468	1091	955
AR8440A	Valueline, Single-sided, 76mm Wide (Phasing out Limited Quantites Avail.)	150	91	13627	55%	1028	280	237	176	154
AR8441A	Valueline, Single-sided, 152mm Wide (Phasing out Limited Quantites Avail.)	150	150	22458	55%	1694	461	390	290	254

Troughs/Partitions/Overhead VED										
AR8561	Power Trough, 600mm Wide (at deepest setting)	157	303	47423	60%	3902	1062	899	668	585
AR8571	Power Trough, 750mm Wide (at deepest setting)	157	303	47423	60%	3902	1062	899	668	585
AR8560	Power Trough, 600mm Wide (at deepest setting)	157	303	47423	60%	3902	1062	899	668	585
AR8570	Power Trough, 750mm Wide (at deepest setting)	157	303	47423	60%	3902	1062	899	668	585
AR8580	Power Trough, 304mm Wide (at deepest setting)	157	303	47423	60%	3902	1062	899	668	585
AR8163ABLK	Data Partition, 600mm Wide with pass-through hole	74	250	18520	60%	1524	415	351	261	228
AR8173BLK	Data Partition, 750mm Wide with pass-through hole	71	250	17840	60%	1468	400	338	251	220
AR8183BLK	Data Partition, 750mm Wide with pass-through hole	71	250	17840	60%	1468	400	338	251	220
AR7751 - AR7754 (also W versions)	Vertical Exhaust Duct Kit (accessorize with AR8621 on left/right inside duct)	Circular Bundles (2)		32.0	60%	1699	462	391	291	255
AR7755 / AR7756 (also W versions)	Vertical Exhaust Duct Overhead Cable Extension (feed onto roof of cabinet)	5.1	6.7	34.2	60%	1814	494	418	311	272
Horizontal Cable Managers										
AR8428	Horizontal Cable Organizer 2U w/ pass through holes	70	64	4435	60%	365	99	84	62	55
AR8425A	Horizontal Cable Organizer 1U	38	64	2419	60%	199	54	46	34	30
AR8426A	Horizontal Cable Organizer 2U	70	64	4435	60%	365	99	84	62	55
AR8427A	Horizontal Cable Organizer 2U with cable fingers	38	64	2419	60%	199	54	46	34	30

AR8600A	Horizontal Cable Manager, 2U x 101mm Deep, single-sided with Cover	89	67	5927	60%	488	133	112	83	73
AR8602A	Horizontal Cable Manager, 1U x 101mm Deep, single-sided with Cover	25	67	1694	60%	139	38	32	24	21
AR8603A	Horizontal Cable Manager, 2U x 152mm Deep, single-sided with Cover	146	76	11129	60%	916	249	211	157	137
AR8605	Horizontal Cable Manager, 3U x 152mm Deep, single-sided with Cover	146	105	15302	60%	1259	343	290	216	189
AR8606	Horizontal Cable Manager, 2U x 152mm Deep, single-sided with Cover	146	76	11129	60%	916	249	211	157	137
AR8612	Horizontal Cable Manager, 1U x 152mm Deep, single-sided with Cover	146	19	2782	60%	229	62	53	39	34
AR7706	Mounting Rail Brush Strips, NetShelter SX, 750mm W (AR3x5x)	72	57	4090	60%	336	92	78	58	50
AR8008BLK	Horizontal Cable Org.Side Channel 450 - 750mm adjustment	58	41	2378	60%	196	53	45	33	29
AR8016ABLK	Horizontal Cable Org. Side Channel 254 to 450mm adjustment	58	41	2378	60%	196	53	45	33	29
AR8429	Horizontal Cable Organizer 1U with Brush Strip	44	429	18721	60%	1540	419	355	264	231
Pass-through Side Panels										
AR7305A	NetShelter SX 42U 1070mm Split Feed Through Side Panels Qty 2	650	144	93447	60%	7688	2093	1771	1316	1152

AR7313	NetShelter SX 42U 1200mm Split Feed Through Side Panels Qty 2	650	144	93447	60%	7688	2093	1771	1316	1152
AR7314	NetShelter SX 48U 1200mm Split Feed Through Side Panels Qty 2	650	144	93447	60%	7688	2093	1771	1316	1152
AR7315	NetShelter SX 45U 1070mm Split Feed Through Side Panels Qty 2	650	144	93447	60%	7688	2093	1771	1316	1152
AR7316	NetShelter SX 45U 1200mm Split Feed Through Side Panels Qty 2	650	144	93447	60%	7688	2093	1771	1316	1152
AR7375	NetShelter SX 48U 1070mm Split Feed Through Side Panels Qty 2	650	144	93447	60%	7688	2093	1771	1316	1152
Cabinets										
AR310x	Roof Brush Strip Openings (x5)	51	165	8387	60%	690	188	159	118	103
AR315x	Roof Brush Strip Openings (x9)	51	165	8387	60%	690	188	159	118	103
AR330x	Roof Brush Strip Openings (x9)	51	165	8387	60%	690	188	159	118	103
AR335x	Roof Brush Strip Openings (x9)	51	165	8387	60%	690	188	159	118	103
AR3140	Roof Brush Strip Openings (x2)	780	277	215821	60%	17756	4833	4091	3040	2661
AR334x	Roof Brush Strip Openings (x2)	780	277	215821	60%	17756	4833	4091	3040	2661
AR3x5x	Mounting rail pass-through holes	54	70	3770	60%	310	84	71	53	46
AR3200	Cable Openings: (1) Top, (1) Bottom	147	121	17787	60%	1463	398	337	251	219
AR4018A / AR4018IA	Lower Cable Entry Port	356	87	30972	60%	2548	694	587	436	382
AR4024A / AR4024IA	Lower Cable Entry Port	356	87	30972	60%	2548	694	587	436	382
AR4038A / AR4038IA	Lower Cable Entry Port	356	87	30972	60%	2548	694	587	436	382
AR4038A / AR4038IA	Upper Cable Entry Port	356	87	30972	60%	2548	694	587	436	382