

VOLTAGE

VOLTAGE DROP – WIRE SELECTION

In the design of the emergency lighting system, it is important to select the proper wire size. When remote lighting fixtures are connected to emergency lighting unit equipment, circuit runs must be of sufficient size to maintain a proper operating voltage to all lamps. The National Electrical Code limits voltage drop to a maximum of 5% of nominal voltage. Table below shows the maximum length of a given battery circuit, assuming that the load is concentrated at the end of the load circuit.

TO DETERMINE THE MAXIMUM LENGTH OF A WIRE RUN NOT LISTED

Divide the value of the load (in watts) in to the constant listed at the bottom of each row. Make sure that maximum ampere rating for the wire is not exceeded.

EXAMPLE: The maximum wire run for #12 AWG wire on a 6 volt system, with 32.4 Watt load, is $542/32.4 = 16$ feet (always round down)

TO DETERMINE THE MAXIMUM LOAD ON A RUN OF KNOWN LENGTH

Divide the length (in feet) in to the constant listed at the bottom of each row. Make sure that maximum ampere rating for the wire is not exceeded.

EXAMPLE: Add 30 foot run on a 6 volt system using #12 AWG wire. $542/30 = 18$ Watts (always round down)

WIRING DISTANCE IN FEET								
Total Watts on Wire Run	6 VOLT SYSTEM				12 VOLT SYSTEM			
	20A MAX	30A MAX	40A MAX	55A MAX	20A MAX	30A MAX	40A MAX	55A MAX
	WIRE GAUGE				WIRE GAUGE			
	#12	#10	#8	#6	#12	#10	#8	#6
5	108	173	276	437	433	693	1104	1749
10	54	87	138	219	217	346	552	874
15	36	58	92	146	144	231	368	583
20	27	43	69	109	108	173	276	437
25	22	35	55	87	87	139	221	350
30	18	29	46	73	72	115	184	291
35	15	25	39	62	62	99	158	250
40	14	22	34	55	54	87	138	219
45	12	19	31	49	48	77	123	194
50	11	17	28	44	43	69	110	175
55	10	16	25	40	39	63	100	159
60	9	14	23	36	36	58	92	146
65	8	13	21	34	33	53	85	135
70	8	12	20	31	31	49	79	125
75	7	12	18	29	29	46	74	117
80	7	11	17	27	27	43	69	109
85	6	10	16	26	25	41	65	103
90	6	10	15	24	24	38	61	97
95	6	9	15	23	23	36	58	92

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	20A MAX	30A MAX	40A MAX	55A MAX	20A MAX	30A MAX	40A MAX	55A MAX
	WIRE GAUGE				WIRE GAUGE			
	#12	#10	#8	#6	#12	#10	#8	#6
100	5	9	14	22	22	35	55	87
105	5	8	13	21	21	33	53	83
110	5	8	13	20	20	31	50	79
115	5	8	12	19	19	30	48	76
120	5	7	11	18	18	29	46	73
125		7	11	17	17	28	44	70
130		7	11	17	17	27	42	67
135		6	10	16	16	26	41	65
140		6	10	16	15	25	39	62
145		6	10	15	15	24	38	60
150		6	9	15	14	23	37	58
155		6	9	14	14	22	36	56
160		5	9	14	14	22	34	55
165		5	8	13	13	21	33	53
170		5	8	13	13	20	32	51
175		5	8	12	12	20	32	50
180			8	12	12	19	31	49
185			7	12	12	19	30	47
190			7	12	11	18	29	46
195			7	11	11	18	28	45
200			7	11	11	17	28	44
205			7	11	11	17	27	43
210			7	10	10	16	26	42
215			6	10	10	16	26	41
220			6	10	10	16	25	40
225			6	10	10	15	25	39
230			6	10	9	15	24	38
235			6	9	9	15	23	37
240				9	9	14	23	36
245				9		14	23	36
Constant Value	542	866	1380	2186	2166	3463	5518	8744