

Computation of SAC Overhead Conductor Ampacities

(Steady State)

Per ANSI/IEEE Standard 738-1986

Wind speed	m/hr	f/s	Temperature		Latitude	Azimuth of line	Elev above msl
Coefficient of emissivity	1.38	2.00	C	F			
Coefficient of solar absorption		0.5	Ambient air temp	40	104	45 degrees N	90 degrees
		0.5	Conductor surface temp	200	392	1000 ft	
Air viscosity @ T ave		0.05463	lb/h ft				
Air density		0.05403	lb/ft <sup>3</sup>				
Air thermal conductivity		0.0101	W/ft C				
Altitude of sun		68.1	degrees				
Azimuth of sun		180	degrees				
Heat rec'd by a surface		94.64	W/ft <sup>2</sup>				
Elevation correction factor		1.0340					

Conductor			Resistance, Ohm/mi			Ohm/kft	Conductor heat transfer, W/ft					Ampacity cond/ft	MVA rating @ nominal voltage							kcm
kcm	strand	diam, in	50 deg C	100 deg C	200 deg C		Forced convection heat loss			Radiated heat loss	Solar heat gain		69 kV	115 kV	138 kV	161 kV	230 kV	345 kV	500 kV	
			deg C	deg C	deg C	deg C	qc1	qc2	max			1	1	1	1	1	2	3		
4/0	6/1	0.583	0.5920	0.6979	0.9097	0.17229	46.46	39.77	46.46	15.72	2.30	690	70	117	141	164			4/0	
268	6/7	0.633	0.5520	0.6507	0.8481	0.16063	49.28	42.67	49.28	17.67	2.58	633	78	128	151	177			268	
336	18/1	0.684	0.3059	0.3606	0.4700	0.08902	51.24	44.70	51.24	19.09	2.79	871	104	174	208	243			336	
336	26/7	0.721	0.3072	0.3623	0.4725	0.08949	52.62	46.14	52.62	20.13	2.94	883	106	176	211	246			336	
477	28/7	0.858	0.2169	0.2557	0.3333	0.06313	57.44	51.21	57.44	23.95	3.50	1111	133	221	266	310			477	
477	24/7	0.846	0.2168	0.2556	0.3332	0.06311	57.04	50.78	57.04	23.62	3.45	1108	132	220	264	308			477	
556	26/7	0.927	0.1860	0.2192	0.2856	0.05409	59.73	53.65	59.73	25.88	3.78	1230	147	245	294	343			556	
636	24/7	0.977	0.1631	0.1922	0.2504	0.04742	61.34	55.37	61.34	27.27	3.98	1336	160	266	319	373	532		636	
795	26/7	1.108	0.1306	0.1538	0.2002	0.03792	65.38	59.71	65.38	30.93	4.52	1556	186	310	372	434	620	1860	4042	795
795	45/7	1.115	0.1313	0.1544	0.2006	0.03799	65.59	59.93	65.59	31.13	4.55	1558	188	310	372	434	620	1861	4047	795
795	30/19	1.140	0.1307	0.1540	0.2006	0.03799	66.33	60.74	66.33	31.82	4.65	1589	187	312	375	437	625	1875	4076	795
954	45/7	1.165	0.1099	0.1291	0.1675	0.03172	67.06	61.53	67.06	32.52	4.75	1729	207	344	413	482	689	2068	4492	954
954	54/7	1.196	0.1094	0.1287	0.1673	0.03169	67.96	62.51	67.96	33.39	4.88	1745	209	348	417	487	695	2085	4533	954
1192	54/19	1.338	0.0863	0.1013	0.1313	0.02487	71.95	66.86	71.95	37.35	5.46	2044	244	407	488	570	814	2442	5309	1192
1272	54/19	1.382	0.0851	0.0996	0.1286	0.02438	73.14	68.17	73.14	38.58	5.63	2087	249	416	499	582	831	2494	5422	1272
1590	54/19	1.545	0.0857	0.0787	0.0987	0.01869	77.41	72.89	77.41	43.13	6.30	1472	295	492	591	689	985	2954	6423	1590
2312	76/19	1.802	0.0505	0.0584	0.0742	0.01405	83.72	79.94	83.72	50.30	7.35	3002	359	598	718	837	1196	3588	7800	2312

Notes:  
 Sun computations based on noon local sun time  
 Solar absorption based on "Clear atmosphere"  
 Azimuth of line: N-S = 0, E-W = 90

Xcel Energy  
 Delivery System Planning & Engineering