NATIONAL ELECTRICAL CODE® (NEC®) 2020

ARTICLE 311 - MEDIUM VOLTAGE CONDUCTORS AND CABLES

The new version of the National Electrical Code® (NEC®) 2020 includes Article 311 regarding Medium Voltage Conductors and Cable. This Article was added to improve overall usability of the NEC®; in the previous versions the ampacity tables for medium voltage cables were in Article 310 while the installation requirements were in Article 328. Therefore, it makes sense to consolidate all the information in the new Article 311.

THE NEW ARTICLE 311 IS STRUCTURED IN FOUR PARTS

Part I - General. Scope, Definitions, and Listing Requirements
Part II - Construction Specifications
Part III - Installation
Part IV - Ampacities

In section 311.60 (D) Ampacity Adjustment (1) Grounded Shields, the National Electrical Code® indicates that the ampacity values show in Table 311.60 (C)(69), Table 311.60(C)(70), Table 311.60(C)(81), and Table 311.60(C)(82) are given for cables with shields grounded at **one point**. Where shields for these cables are grounded at **more than one point**, the ampacities values must be adjusted.

The problem is that there are not correction factors or tables for shields grounded at **more than one point** in the National Electrical Code® (NEC®) 2020.

Southwire's CableTechSupport™ Services team expanded Table 311.60 (C)(69), Table 311.60(C)(70), Table 311.60(C)(81), and Table 311.60(C)(82) for cables with metallic shields grounded at **more than one point** using the thermal method Neher-McGrath.

SHIELDS GROUNDED AT ONE POINT

SHIELDS GROUNDED AT MORE THAN ONE POINT

This document includes the tables with ampacity values for cables with shields grounded at **more than one point**.

- **Table 311.60 (C)(69)** - Ampacities of Insulated Single Copper Conductor Isolated in Air

SHIELDS GROUNDED AT ONE POINT: NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-15000 VOLTS AMPACITY		15001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	83	93	-	-	-	-
6	110	120	110	125	-	-
4	145	160	150	165	-	-
2	190	215	195	215	-	-
1	225	250	225	250	225	250
1/0	260	290	260	290	260	290
2/0	300	330	300	335	300	330
3/0	345	385	345	385	345	380
4/0	400	445	400	445	395	445
250	445	495	445	495	440	490
350	550	615	550	610	545	605
500	695	775	685	765	680	755
750	900	1000	885	990	870	970
1000	1075	1200	1060	1185	1040	1160
1250	1230	1370	1210	1350	1185	1320
1500	1365	1525	1345	1500	1315	1465
1750	1495	1665	1470	1640	1430	1595
2000	1605	1790	1575	1755	1535	1710

Table 311.60 (C)(69) - Ampacities of Insulated Single Copper Conductor Isolated in Air

SHIELDS GROUNDED AT MORE THAN ONE POINT: SOUTHWIRE - CALCULATED AS PER NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-15000 VOLTS AMPACITY		15001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	83	93	-	-	-	-
6	110	120	110	125	-	-
4	144	159	150	165	-	-
2	188	214	194	213	-	-
1	223	248	224	248	225	250
1/0	257	286	257	287	257	288
2/0	296	326	296	331	296	326
3/0	339	378	339	378	339	374
4/0	391	435	391	435	387	437
250	432	481	432	482	430	479
350	528	591	528	587	527	586
500	654	732	646	724	647	720
750	824	918	812	912	809	904
1000	959	1075	949	1065	947	1059
1250	1077	1204	1067	1194	1059	1184
1500	1172	1315	1165	1304	1156	1292
1750	1265	1413	1255	1405	1241	1389
2000	1339	1500	1327	1483	1316	1470

Table 311.60 (C)(69) - Ampacities of Insulated Single Copper Conductor Isolated in Air

- **Table 311.60 (C)(70)** - Ampacities of Insulated Single Aluminum Conductor Isolated in Air

SHIELDS GROUNDED AT ONE POINT: NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-15000 VOLTS AMPACITY		15001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	64	71	-	-	-	-
6	85	95	87	97	-	-
4	115	125	115	130	-	-
2	150	165	150	170	-	-
1	175	195	175	195	175	195
1/0	200	225	200	225	200	225
2/0	230	260	235	260	230	260
3/0	270	300	270	300	270	300
4/0	310	350	310	350	310	345
250	345	385	345	385	345	380
350	430	480	430	480	430	475
500	545	605	535	600	530	590
750	710	790	700	780	685	765
1000	855	950	840	940	825	920
1250	980	1095	970	1080	950	1055
1500	1105	1230	1085	1215	1060	1180
1750	1215	1355	1195	1335	1165	1300
2000	1320	1475	1295	1445	1265	1410

Table 311.60(C)(70) Ampacities of Insulated Single Aluminum Conductor Isolated in Air

SHIELDS GROUNDED AT MORE THAN ONE POINT: SOUTHWIRE - CALCULATED AS PER NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-15000 VOLTS AMPACITY		15001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	64	71	-	-	-	-
6	85	95	87	97	-	-
4	115	125	115	130	-	-
2	150	164	150	170	-	-
1	174	194	174	194	175	195
1/0	199	224	199	224	199	224
2/0	228	257	233	258	228	258
3/0	267	297	267	297	267	298
4/0	306	345	305	345	307	341
250	339	378	340	379	340	374
350	419	468	420	469	421	465
500	525	584	516	580	514	573
750	671	748	662	740	654	732
1000	793	884	781	877	776	868
1250	896	1004	892	996	881	982
1500	995	1112	983	1106	972	1084
1750	1080	1209	1069	1199	1055	1181
2000	1158	1300	1144	1282	1134	1269

Table 311.60(C)(70) Ampacities of Insulated Single Aluminum Conductor Isolated in Air

- **Table 311.60 (C)(81)** - Ampacities of Single Insulated Copper Conductors Directly Buried in Earth
  One Circuit, Three Conductors, Detail 9

SHIELDS GROUNDED AT ONE POINT
NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	110	115	-	-
6	140	150	130	140
4	180	195	170	180
2	230	250	210	225
1	260	280	240	260
1/0	295	320	275	295
2/0	335	365	310	335
3/0	385	415	355	380
4/0	435	465	405	435
250	470	510	440	475
350	570	615	535	575
500	690	745	650	700
750	845	910	805	865
1000	980	1055	930	1005

Table 311.60(C)(81) Ampacities of Single Insulated Copper Conductors Directly Buried in Earth

SHIELDS GROUNDED AT MORE THAN ONE POINT
SOUTHWIRE - CALCULATED AS PER NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	110	115	-	-
6	140	150	130	140
4	180	195	170	180
2	230	250	210	225
1	260	280	240	259
1/0	295	320	275	295
2/0	335	365	309	335
3/0	384	415	355	380
4/0	434	464	404	434
250	469	509	439	473
350	568	612	533	572
500	686	741	645	694
750	837	901	795	855
1000	967	1042	914	988

Table 311.60(C)(81) Ampacities of Single Insulated Copper Conductors Directly Buried in Earth

- **Table 311.60 (C)(81)** - Ampacities of Single Insulated Copper Conductors Directly Buried in Earth
  Two Circuits, Six Conductors, Detail 10

SHIELDS GROUNDED AT ONE POINT
NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	100	110	-	-
6	130	140	120	130
4	165	180	160	170
2	215	230	195	210
1	240	260	225	240
1/0	275	295	255	275
2/0	310	335	290	315
3/0	355	380	330	355
4/0	400	430	375	405
250	435	470	410	440
350	520	560	495	530
500	630	680	600	645
750	775	835	740	795
1000	890	960	855	920

Table 311.60(C)(81) Ampacities of Single Insulated Copper Conductors Directly Buried in Earth

SHIELDS GROUNDED AT MORE THAN ONE POINT
SOUTHWIRE - CALCULATED AS PER NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	100	110	-	-
6	130	140	120	130
4	165	180	160	170
2	215	230	194	210
1	240	260	225	240
1/0	274	295	254	275
2/0	309	334	289	315
3/0	354	379	329	354
4/0	399	429	374	404
250	434	469	408	438
350	518	558	493	527
500	627	676	596	641
750	769	828	731	786
1000	880	949	842	906

Table 311.60(C)(81) Ampacities of Single Insulated Copper Conductors Directly Buried in Earth

- **Table 311.60 (C)(82)** - Ampacities of Single Insulated Aluminum Conductors Directly Buried in Earth
  One Circuit, Three Conductors, Detail 9

SHIELDS GROUNDED AT ONE POINT
NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	85	90	-	-
6	110	115	100	110
4	140	150	130	140
2	180	195	165	175
1	205	220	185	200
1/0	230	250	215	230
2/0	265	285	245	260
3/0	300	320	275	295
4/0	340	365	315	340
250	370	395	345	370
350	445	480	415	450
500	540	580	510	545
750	665	720	635	680
1000	780	840	740	795

Table 311.60(C)(82) Ampacities of Single Insulated Aluminum Conductors Directly Buried in Earth

SHIELDS GROUNDED AT MORE THAN ONE POINT
SOUTHWIRE - CALCULATED AS PER NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	85	90	-	-
6	109	115	100	110
4	140	150	130	140
2	179	195	165	175
1	205	220	185	200
1/0	230	250	215	230
2/0	264	285	244	260
3/0	300	320	274	295
4/0	338	364	314	339
250	370	394	344	369
350	444	478	413	449
500	538	578	507	542
750	661	716	630	675
1000	773	833	731	786

Table 311.60(C)(82) Ampacities of Single Insulated Aluminum Conductors Directly Buried in Earth

- **Table 311.60 (C)(82)** - Ampacities of Single Insulated Aluminum Conductors Directly Buried in Earth
  Two Circuits, Six Conductors, Detail 10

SHIELDS GROUNDED AT ONE POINT
NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	80	85	-	-
6	100	110	95	100
4	130	140	125	130
2	165	180	155	165
1	190	200	175	190
1/0	215	230	200	215
2/0	245	260	225	245
3/0	275	295	255	275
4/0	310	335	290	315
250	340	365	320	345
350	410	440	385	415
500	495	530	470	505
750	610	655	580	625
1000	710	765	680	730

Table 311.60(C)(82) Ampacities of Single Insulated Aluminum Conductors Directly Buried in Earth

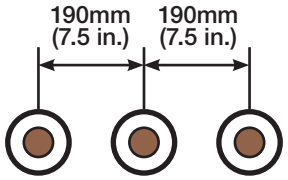
SHIELDS GROUNDED AT MORE THAN ONE POINT
SOUTHWIRE - CALCULATED AS PER NEC® 2020

	2001-5000 VOLTS AMPACITY		5001-35000 VOLTS AMPACITY	
CONDUCTOR SIZE (AWG OR KCMIL)	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105	90°C (194°F) TYPE MV-90	105°C (221°F) TYPE MV-105
8	80	85	-	-
6	100	110	95	100
4	130	140	125	130
2	165	180	155	165
1	190	199	175	190
1/0	215	230	200	214
2/0	245	260	225	244
3/0	274	295	255	275
4/0	309	334	289	315
250	339	365	319	345
350	409	439	384	414
500	493	528	468	503
750	606	652	576	621
1000	705	759	673	722

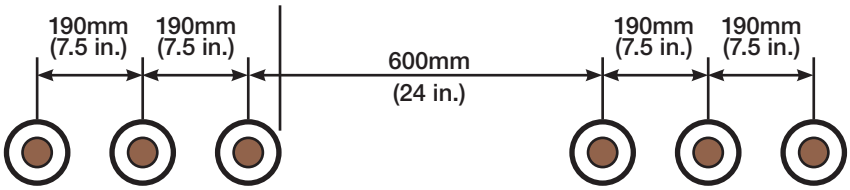
Table 311.60(C)(82) Ampacities of Single Insulated Aluminum Conductors Directly Buried in Earth

CABLE INSTALLATION DETAILS 9 AND 10

- **Figure 310.60(C)(3)** - Cable Installation Dimensions Used with Table 311.60(81) and Table 311.60(82)



DETAIL 9
Buried single conductor cables (1 Circuit)



DETAIL 10
Buried single conductor cables (2 Circuits)

*Cable details from NEC® 2020