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NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

2101 L STREET N.W. WASHINGTON, D.C. 20037

TO ALL REPRESENTATIVES OF MEMBER COMPANIES
IN THE POWER AND CONTROL CABLE SECTION

Subject: Revision #2 for the ICEA-NEMA Standards Publication for Ampacities of Cables in Open-top Cable Trays, ICEA Pub. No. P-54-440 (Second Edition), NEMA Pub. No. WC 51-1975

Gentlemen:

The second set of revised pages, dated August 1979, is enclosed for insertion of your copy of the subject publication. These pages will bring your book completely up to date.

Please insert the revised pages carefully, in the correct publication, as extra copies are not available. A new front cover to indicate that your book now contains Revision Nos. 1 and 2 is also enclosed. For your convenience, we are showing on the reverse of the cover a checklist of the pages now comprising ICEA Pub. No. P-54-440 (2nd Edition), NEMA Pub. No. WC 51-1975.

Your attention is called to the fact that on March 7, 1979, the name of the Insulated Power Cable Engineers Association (IPCEA) was changed to Insulated Cable Engineers Association (ICEA). This change is reflected in the enclosed revised pages.

Sincerely yours,

Judy P. Sopronyi

Judy P. Sopronyi
Standards Publications Editor

Enc: Rev. 2 to ICEA P-54-440 (2nd Ed.)/NEMA WC 51-1975.

Copies to: All Known Holders of WC 51-1975

JPS/fa

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August 1979

The following pages now comprise the ICEA*-NEMA Standards Publication for Ampacities of Cables in Open-top Cable Trays, ICEA* Pub. No. P-54-440 (2nd Edition), NEMA Pub. No. WC 51-1975.

Page	Date
Front Cover	August 1979
Inside Cover	August 1979
Preface and Table of Contents	August 1979
i - x	Undated
xi - xii	August 1979
xiii	March 1976

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(Page viii revised March 1976)
Rev. No. 2—August 1979

ICEA-NEMA Standards Publication

Ampacities
Cables in Open-top Cable Trays



INSULATED CABLE ENGINEERS ASSOCIATION



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ICEA*-NEMA Standards Publication

Ampacities
Cables in Open-top Cable Trays

Approved by Insulated Cable Engineers Association* May 12, 1975

Approved as Authorized Engineering Information May 12, 1975
National Electrical Manufacturers Association

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PREFACE ▲

Ampacity tables for cables in trays were published in IPCEA Publication No. P-33-440, April 2, 1959, which assumed a load diversity but did not specifically define the diversity. The demands of modern generating plants, both nuclear and fossil fueled, require a more precise definition of operating conditions for the determination of cable ampacities.

ICEA*-NEMA standards are adopted in the public interest and are designed to eliminate the misunderstanding between the manufacturer and the user and to assist the user in selecting and obtaining the proper product for his particular need. Existence of an ICEA*-NEMA standard does not in any respect preclude the manufacture or use of products not conforming to the standard.

Experimental work with various cables and the loading of trays by J. Stolpe[1] and the theory developed by Stolpe and others[2, 3] provided a more accurate means of calculating ampacities of cables in trays. This work was utilized by a joint committee of IPCEA and the IEEE Insulated Conductor Committee in preparing the ampacity tables which were published in the IPCEA-NEMA Standards Publication for Ampacities of Cables in Open-top Cable Trays, IPCEA Pub. No. P-54-440, NEMA Pub. No. WC 51-1972, and which superseded the factors in Table B for cables without maintained spacing in the IPCEA "Factors for Calculating Ampacities of Cables Installed in Ladder Supports, Trays and Troughs," P-33-440, April 2, 1959. Table A of that publication covering factors for cables with maintained spacing is not affected.

The Members of IEEE-IPCEA Joint Committee at that time were:

R. C. Waldron, Chairman
D. A. Costello
E. Finch
E. L. Kolmorgen
M. J. Koulopoulos
R. H. Lee
R. A. Peterson
D. A. Silver
J. Stolpe

This 1975 edition of the ICEA*-NEMA Standards Publication has been expanded to cover 15 kV cables and includes a great many editorial corrections which clarify the 1972 document.

* On March 7, 1979, the name of the Insulated Power Cable Engineers Association (IPCEA) was changed to Insulated Cable Engineers Association (ICEA).
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AMPACITIES OF CABLES IN OPEN-TOP CABLE TRAYS

A. SCOPE

This publication covers ampacities for 0-15 000 volt solid dielectric insulated single-conductor, triplexed and three-conductor cables having a calculated depth up to 3 inches when installed in open-top cable trays. It is intended primarily for use by the utility industry.

The ampacities have been calculated on a 100 percent load factor with all cables fully loaded and not spaced. No diversity is included. The ampacities are based on a conductor temperature of 90°C and an air ambient temperature of 40°C. Ampacities for cable diameters other than those shown in the tables can be calculated by direct proportion to the diameter.

B. USE OF TABLES

Calculated Depth of Cables in Trays

The depth of cables in tray is calculated as follows:

$$\text{Calculated Depth, Inches} = \frac{n_1 d_1^2 + n_2 d_2^2 + \ldots . n_n d_n^2}{w}$$

where—

$d_1, d_2 \ldots d_n$ = diameter of cables, inches.

$n_1, n_2 \ldots n_n$ = number of cables of diameters $d_1, d_2 \ldots d_n$, respectively.

w = width of tray, inches.

Ampacities of cables in trays are limited to 80 percent of the ampacities of cables in free air as taken from IPCEA Publication No. P-46-426 (AIEE Publication S-135-1), Table VIII, page V. This permits the grouping of cables of larger diameters in a single layer.

Diameters of Cables

The diameters of cables are given in each table. For cable diameters less than the calculated depth, the ampacity can be calculated by direct proportion to the cable diameters as follows:

$$I_x = \frac{d_x}{d_o} I_o$$

where—

I_o = ampacity for cable diameter d_o from the table.

I_x = ampacity for cable diameter d_x.

Temperatures

The tables are based on a conductor temperature of 90°C and an ambient air temperature of 40°C. If trays are stacked, the ambient temperature of the upper trays will obviously be higher depending on the amount of ventilation around the trays. In cable tunnels without forced ventilation, a 50°C ambient will frequently exist at the top of the tunnel. The following factors should be used for correcting for different ambient air temperatures.

Correction for Ambient Temperature

Ambient Temperature, Degrees C	Multiplying Factor
30	1.09
35	1.05
40	1.00
45	0.95
50	0.90
55	0.85

The rating for conductor temperatures differing from 90°C should be determined by the following multiplying factors:

Correction for Conductor Temperature

Conductor Temperature, Degrees C	Multiplying Factor
125	1.24
90	1.00
85	0.95
75	0.86
70	0.80
60	0.66

Where both the ambient temperature and conductor temperature differ from those shown in the tables, the product of both correction factors should be used.

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Number of Conductors

The tables apply to single-conductor, triplexed and three-conductor cables. For other numbers of conductors, the current will vary as the square root of the number of conductors carrying current, and the ampacity can be calculated as follows:

$$I'_x = \frac{d'_x}{d'_o} \; I'_o \; \sqrt{\frac{3}{n_x}}$$

where—

I'_o = ampacity for three-conductor cable from the table.

I'_x = ampacity for cable having n_x conductors.

d'_x = diameter of cable having n_x conductors.

d'_o = diameter of three-conductor cable from table.

C. REFERENCES

1 IEEE Transaction Paper 70 TP 557 PWR "Ampacities for Cables in Randomly Filled Trays," by J. Stolpe.

2 IEEE Transaction Paper 71 TP 543 PWR "Ampacities of Multiconductor Cables in Trays," by Ralph Lee.

3 Underwriters' Laboratories, Inc., Report E20078 for T. J. Cope.

D. APPENDIX

In this publication, the following values were assigned to the constants used in the formulae in Stolpe's paper.

h = overall convection heat transfer coefficient for the tray in (watts/ft^2) / °C

$$= 0.446 \left(\frac{\Delta T}{w}\right)^{1/4}$$

$$= 0.201 \; (\Delta T)^{1/4}$$

(For 24-inch wide tray. The increase in ampacity using a 12-inch tray is less than 2 percent. The decrease in ampacities for widths greater than 24 inches is negligible.)

ΔT = temperature drop through air, degrees C.

w = width of tray, inches.

σ = Stefan-Boltzman constant in (watts/ft^2) / K^4

$$= 0.530 \times 10^{-8}$$

ε = effective thermal emissivity of cable mass and tray surface

= 0.8 based on open-top trays. This is the arithmetic average of the top cable surface and bottom cable and tray surface emissivities—

$$0.95 + \left(\frac{0.95 + 0.33}{2}\right) / 2 = 0.8$$

Skin effect was taken into account but not proximity effect. Shields were assumed to be open circuited; thus, shield losses were not included.

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AMPACITIES OF 0-600 VOLT COPPER-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 1
Single-conductor Nonjacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.14	6	5	4	3	3
12	0.16	8	7	5	5	4
10	0.18	12	9	8	7	6
9	0.19	14	11	9	8	7
8	0.24	20	16	13	11	10
6	0.28	29	23	19	16	14
4	0.33	44	34	28	24	21
2	0.39	65	51	42	36	31
1	0.45	85	66	54	46	41
1/0	0.49	103	80	66	57	50
2/0	0.54	128	99	82	70	62
3/0	0.59	157	122	100	86	76
4/0	0.65	195	151	125	107	94
250	0.72	234	181	149	128	113
350	0.83	318	246	204	175	153
500	0.96	440	341	282	242	212
750	1.18	657	509	421	361	317
1000	1.34	852	660	545	468	411

Table 2
Triplexed Cable with
Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.29	7	5	4	4	3
12	0.34	10	8	7	6	5
10	0.39	15	12	10	8	7
9	0.42	18	14	12	10	9
8	0.52	25	19	16	14	12
6	0.60	36	28	23	20	18
4	0.71	54	42	35	30	26
2	0.84	81	63	52	45	39
1	0.97	105	82	67	58	51
1/0	1.06	129	100	83	71	62
2/0	1.16	159	123	102	87	77
3/0	1.28	197	152	126	108	95
4/0	1.41	245	190	157	134	118
250	1.55	291	225	186	160	140
350	1.79	371	308	254	218	191
500	2.08	464	429	355	304	267
750	2.55	598	598	532	456	401

Table 3
Three-conductor Jacketed Cable with
Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.38	9	7	6	5	4
12	0.43	13	10	8	7	6
10	0.48	18	14	12	10	9
9	0.51	22	17	14	12	11
8	0.64	31	24	20	17	15
6	0.72	44	34	28	24	21
4	0.83	64	49	41	35	31
2	1.00	97	75	62	53	47
1	1.13	123	95	79	67	59
1/0	1.22	149	115	95	82	72
2/0	1.32	172	140	116	99	87
3/0	1.44	199	171	142	121	107
4/0	1.57	229	211	174	149	131
250	1.78	256	256	214	183	161
350	2.01	315	315	285	245	215
500	2.30	390	390	390	336	295
750	2.83	492	492	492	492	445

* See Section B.

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AMPACITIES OF 0-600 VOLT COPPER-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 4
Single-conductor Jacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.17	7	5	5	4	3
12	0.19	10	8	6	5	5
10	0.21	14	11	9	8	7
9	0.22	16	13	10	9	8
8	0.27	23	17	14	12	11
6	0.34	36	28	23	20	17
4	0.39	52	40	33	28	25
2	0.45	75	58	48	41	36
1	0.54	102	79	65	56	49
1/0	0.58	122	95	78	67	59
2/0	0.63	149	116	96	82	72
3/0	0.68	181	140	116	99	87
4/0	0.74	222	172	142	122	107
250	0.85	276	214	176	151	133
350	0.96	368	285	235	202	177
500	1.09	500	387	320	274	241
750	1.31	718	565	467	400	352
1 000	1.47	861	724	598	513	450

Table 5
Triplexed Cable with Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.36	9	7	6	5	4
12	0.40	12	9	8	7	6
10	0.45	17	13	11	9	8
9	0.49	21	16	13	12	10
8	0.59	28	22	18	16	14
6	0.74	45	35	29	25	22
4	0.84	64	50	41	35	31
2	0.97	94	73	60	51	45
1	1.17	127	98	81	70	61
1/0	1.26	154	119	98	84	74
2/0	1.36	186	144	119	102	90
3/0	1.48	227	176	146	125	110
4/0	1.60	268	215	178	152	134
250	1.84	299	267	221	189	166
350	2.07	371	356	294	252	221
500	2.37	464	464	404	347	304
750	2.84	598	598	593	508	446

Table 6
Three-conductor Jacketed Cable with Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.45	11	8	7	6	5
12	0.49	15	11	9	8	7
10	0.57	22	17	14	12	11
9	0.61	26	20	17	14	13
8	0.71	34	27	22	19	16
6	0.90	55	42	35	30	26
4	1.00	77	59	49	42	37
2	1.13	109	85	70	60	53
1	1.33	129	112	92	79	70
1/0	1.42	149	134	111	95	83
2/0	1.52	172	161	133	114	100
3/0	1.64	199	195	161	138	121
4/0	1.82	229	229	202	173	152
250	2.06	256	256	247	212	186
350	2.29	315	315	315	279	245
500	2.59	390	390	390	379	333
750	3.12	492	492	492	492	492

* See Section B.

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AMPACITIES OF 601-2000 VOLT COPPER-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 7
Single-conductor Nonjacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.17	7	5	5	4	3
12	0.19	10	8	6	5	5
10	0.21	14	11	9	8	7
9	0.22	16	13	10	9	8
8	0.26	22	17	14	12	10
6	0.30	32	24	20	17	15
4	0.35	46	36	30	25	22
2	0.41	69	53	44	38	33
1	0.47	88	68	57	48	43
1/0	0.51	108	83	69	59	52
2/0	0.56	133	103	85	73	64
3/0	0.61	162	126	104	89	78
4/0	0.67	201	156	129	110	97
250	0.74	240	186	154	132	116
350	0.85	326	252	208	179	157
500	0.98	449	348	288	247	217
750	1.20	668	518	428	367	322
1000	1.36	861	670	554	475	417

Table 8
Triplexed Cable with Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.36	9	7	6	5	4
12	0.40	12	9	8	7	6
10	0.45	17	13	11	9	8
9	0.49	21	16	13	12	10
8	0.56	27	21	17	15	13
6	0.65	40	31	25	22	19
4	0.75	57	45	37	32	28
2	0.89	86	67	55	47	41
1	1.02	111	86	71	61	53
1/0	1.11	135	105	87	74	65
2/0	1.21	166	128	106	91	80
3/0	1.32	203	157	130	111	98
4/0	1.45	252	195	161	138	121
250	1.60	299	233	192	165	145
350	1.83	371	315	260	223	196
500	2.12	464	438	362	310	272
750	2.60	598	598	543	465	409

Table 9
Three-conductor Jacketed Cable with Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.45	11	8	7	6	5
12	0.49	15	11	9	8	7
10	0.57	22	17	14	12	11
9	0.61	26	20	17	14	13
8	0.68	33	25	21	18	16
6	0.77	47	36	30	26	23
4	0.91	70	54	45	38	34
2	1.05	101	79	65	56	49
1	1.18	128	99	82	70	62
1/0	1.27	149	120	99	85	75
2/0	1.37	172	145	120	103	90
3/0	1.48	199	176	146	125	110
4/0	1.61	229	216	179	153	135
250	1.82	256	256	219	187	165
350	1.95	315	315	277	237	209
500	2.34	390	390	390	342	300
750	3.22	492	492	492	492	492

* See Section B.

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AMPACITIES OF 601-2000 VOLT COPPER-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 10
Single-conductor Jacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.20	8	6	5	5	4
12	0.22	12	9	7	6	6
10	0.24	16	12	10	9	8
9	0.26	19	15	12	11	9
8	0.29	24	19	16	13	12
6	0.36	38	29	24	21	18
4	0.41	54	42	35	30	26
2	0.47	79	61	50	43	38
1	0.56	105	82	67	58	51
1/0	0.60	127	98	81	70	61
2/0	0.65	154	119	99	85	74
3/0	0.70	186	144	119	102	90
4/0	0.76	228	177	146	125	110
250	0.87	282	219	181	155	136
350	0.98	376	291	240	206	181
500	1.12	514	398	329	282	248
750	1.33	718	574	474	406	357
1000	1.49	861	734	606	520	457

Table 11
Triplexed Cable with Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.43	10	8	7	6	5
12	0.47	14	11	9	8	7
10	0.52	20	15	13	11	10
9	0.55	24	18	15	13	11
8	0.63	30	24	19	17	15
6	0.78	47	37	30	26	23
4	0.89	68	53	44	37	33
2	1.02	99	76	63	54	48
1	1.22	132	103	85	73	64
1/0	1.31	160	124	102	88	77
2/0	1.40	192	148	123	105	92
3/0	1.52	229	181	150	128	113
4/0	1.65	268	222	183	157	138
250	1.92	299	279	231	198	174
350	2.16	371	371	307	263	231
500	2.41	464	464	411	352	309
750	2.88	598	598	598	515	452

Table 12
Three-conductor Jacketed Cable with Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
14	0.52	13	10	8	7	6
12	0.59	18	14	11	10	9
10	0.64	24	19	16	13	12
9	0.67	29	22	18	16	14
8	0.75	36	28	23	20	17
6	0.94	57	44	37	31	28
4	1.05	80	62	52	44	39
2	1.18	110	88	73	63	55
1	1.38	129	116	96	82	72
1/0	1.47	149	139	115	98	86
2/0	1.56	172	165	137	117	103
3/0	1.68	199	200	165	142	124
4/0	1.87	229	229	208	178	156
250	2.10	256	256	252	216	190
350	2.34	315	315	315	285	250
500	2.63	390	390	390	385	338
750	3.16	492	492	492	492	492

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AMPACITIES OF 2001-5000 VOLT COPPER-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 13
Single-conductor Shielded and Jacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
8	0.47	39	30	25	22	19
6	0.53	56	43	36	31	27
4	0.58	77	60	49	42	37
2	0.64	107	83	69	59	52
1	0.68	128	99	82	70	62
1/0	0.72	152	118	97	83	73
2/0	0.77	182	141	117	100	88
3/0	0.86	229	177	146	126	110
4/0	0.92	276	214	177	152	133
250	0.99	321	249	206	176	155
350	1.07	410	318	262	225	198
500	1.20	550	426	352	302	265
750	1.39	711	600	495	425	373
1 000	1.54	849	759	627	537	472

Table 14
Triplexed Cable with Shielded and Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
8	1.01	49	38	31	27	23
6	1.15	70	54	45	38	34
4	1.26	97	75	62	53	47
2	1.39	134	104	86	74	65
1	1.47	155	124	102	88	77
1/0	1.56	178	147	122	104	92
2/0	1.66	205	176	145	125	109
3/0	1.86	236	221	183	157	138
4/0	1.99	273	267	221	189	166
250	2.13	303	303	256	219	193
350	2.32	373	373	330	283	248
500	2.60	462	462	443	380	334
750	3.00	582	582	582	537	471

Table 15
Three-conductor Jacketed Cable with Nonshielded and Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
8	0.92	44	34	28	24	21
6	1.00	61	47	39	33	29
4	1.10	84	65	54	46	41
2	1.23	119	92	76	65	57
1	1.32	143	111	92	79	69
1/0	1.41	169	133	110	94	83
2/0	1.50	194	159	131	113	99
3/0	1.62	223	193	159	137	120
4/0	1.80	257	242	200	171	150
250	1.95	284	283	234	201	176
350	2.13	348	348	303	259	228
500	2.42	428	428	413	354	311
750	2.88	534	534	534	515	452

Table 16
Three-conductor Jacketed Cable with Nonshielded and Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
8	1.02	49	38	31	27	24
6	1.11	67	52	43	37	33
4	1.21	93	72	59	51	45
2	1.36	127	102	84	72	63
1	1.45	147	122	101	86	76
1/0	1.54	169	145	120	103	90
2/0	1.63	194	173	143	122	108
3/0	1.81	223	216	178	153	134
4/0	2.02	257	257	224	192	169
250	2.16	284	284	259	222	195
350	2.36	348	348	335	287	252
500	2.63	428	428	428	385	338
750	3.09	534	534	534	534	485

* See Section B.

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AMPACITIES OF 0-600 VOLT ALUMINUM-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 17
Single-conductor Nonjacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.16	7	5	4	4	3
10	0.18	9	7	6	5	5
9	0.19	11	9	7	6	5
8	0.24	16	12	10	9	8
6	0.28	23	18	15	13	11
4	0.33	35	27	22	19	17
2	0.39	52	40	33	29	25
1	0.45	67	52	43	37	32
1/0	0.49	82	64	53	45	40
2/0	0.54	102	79	65	56	49
3/0	0.59	125	97	80	69	60
4/0	0.65	155	120	99	85	75
250	0.72	186	144	119	102	90
350	0.83	254	197	162	139	122
500	0.96	350	272	224	192	169
750	1.18	526	407	336	288	253
1000	1.34	682	532	439	376	331

Table 18
Triplexed Cable with
Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.34	8	6	5	5	4
10	0.39	12	9	8	7	6
9	0.42	14	11	9	8	7
8	0.52	20	15	13	11	10
6	0.60	29	23	19	16	14
4	0.71	43	34	28	24	21
2	0.84	65	50	41	35	31
1	0.97	84	65	54	46	40
1/0	1.06	103	80	66	56	50
2/0	1.16	126	98	81	69	61
3/0	1.28	157	121	100	86	75
4/0	1.41	194	150	124	106	93
250	1.55	232	179	148	127	112
350	1.79	291	245	203	174	152
500	2.08	366	340	281	241	212
750	2.55	478	478	422	362	318

Table 19
Three-conductor Jacketed Cable with
Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.43	10	8	7	6	5
10	0.48	15	11	9	8	7
9	0.51	17	14	11	10	8
8	0.64	25	19	16	13	12
6	0.72	35	27	22	19	17
4	0.83	51	39	32	28	24
2	1.00	77	60	49	42	37
1	1.13	98	76	63	54	47
1/0	1.22	116	92	76	65	57
2/0	1.32	134	112	92	79	69
3/0	1.44	155	137	113	97	85
4/0	1.57	179	167	138	118	104
250	1.78	200	200	170	146	128
350	2.01	247	247	227	195	171
500	2.30	308	308	308	267	234
750	2.83	396	396	396	396	353

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AMPACITIES OF 0-600 VOLT ALUMINUM-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 20
Single-conductor Jacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.19	8	6	5	4	4
10	0.21	11	9	7	6	5
9	0.22	13	10	8	7	6
8	0.27	18	14	11	10	9
6	0.34	29	22	18	16	14
4	0.39	41	32	26	23	20
2	0.45	60	46	38	33	29
1	0.54	81	63	52	44	39
1/0	0.58	98	76	62	54	47
2/0	0.63	119	92	76	65	57
3/0	0.68	144	112	92	79	69
4/0	0.74	176	136	113	97	85
250	0.85	220	170	141	121	106
350	0.96	294	227	188	161	141
500	1.09	398	308	255	218	192
750	1.31	565	452	374	320	281
1000	1.47	682	583	482	413	363

Table 21
Triplexed Cable with Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.40	10	7	6	5	5
10	0.45	14	11	9	8	7
9	0.49	17	13	11	9	8
8	0.59	23	18	15	12	11
6	0.74	36	28	23	20	17
4	0.84	51	40	33	28	25
2	0.97	75	58	48	41	36
1	1.17	101	78	65	56	49
1/0	1.26	122	95	78	67	59
2/0	1.36	148	115	95	81	71
3/0	1.48	179	140	116	99	87
4/0	1.60	210	170	141	121	106
250	1.84	234	213	176	151	132
350	2.07	291	284	234	201	176
500	2.37	366	366	320	275	241
750	2.84	478	478	470	403	354

Table 22
Three-conductor Jacketed Cable with Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.49	12	9	8	6	6
10	0.57	17	13	11	10	8
9	0.61	21	16	13	11	10
8	0.71	27	21	17	15	13
6	0.90	44	34	28	24	21
4	1.00	61	47	39	34	29
2	1.13	86	67	56	48	42
1	1.33	101	89	74	63	55
1/0	1.42	116	107	88	76	66
2/0	1.52	134	128	106	91	80
3/0	1.64	155	155	128	110	97
4/0	1.82	179	179	160	137	121
250	2.06	200	200	197	169	148
350	2.29	247	247	247	222	195
500	2.59	308	308	308	300	264
750	3.12	396	396	396	396	389

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AMPACITIES OF 601-2000 VOLT ALUMINUM-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 23
Single-conductor Nonjacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.19	8	6	5	4	4
10	0.21	11	9	7	6	5
9	0.22	13	10	8	7	6
8	0.26	17	13	11	9	8
6	0.30	25	19	16	14	12
4	0.35	37	29	24	20	18
2	0.41	55	42	35	30	26
1	0.47	70	55	45	39	34
1/0	0.51	86	66	55	47	41
2/0	0.56	106	82	68	58	51
3/0	0.61	129	100	83	71	62
4/0	0.67	159	124	102	87	77
250	0.74	191	148	122	105	92
350	0.85	260	201	166	143	125
500	0.98	358	277	229	196	172
750	1.20	535	414	342	293	258
1000	1.36	682	539	446	382	336

Table 24
Triplexed Cable with
Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.40	10	7	6	5	5
10	0.45	14	11	9	8	7
9	0.49	17	13	11	9	8
8	0.56	22	17	14	12	10
6	0.65	31	24	20	17	15
4	0.75	46	35	29	25	22
2	0.89	69	53	44	38	33
1	1.02	88	68	56	48	42
1/0	1.11	108	84	69	59	52
2/0	1.21	132	102	84	72	64
3/0	1.32	162	125	103	89	78
4/0	1.45	199	154	128	109	96
250	1.60	234	185	153	131	115
350	1.83	291	251	207	178	156
500	2.12	366	347	287	246	216
750	2.60	478	478	430	369	324

Table 25
Three-conductor Jacketed Cable with
Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.49	12	9	8	6	6
10	0.57	17	13	11	10	8
9	0.61	21	16	13	11	10
8	0.68	26	20	17	14	13
6	0.77	37	29	24	20	18
4	0.91	56	43	36	30	27
2	1.05	81	63	52	44	39
1	1.18	101	79	65	56	49
1/0	1.27	116	96	79	68	59
2/0	1.37	134	116	96	82	72
3/0	1.48	155	140	116	99	87
4/0	1.61	179	171	142	121	107
250	1.82	200	200	174	149	131
350	1.95	247	247	221	189	166
500	2.34	308	308	308	271	238
750	3.22	396	396	396	396	396

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AMPACITIES OF 601-2000 VOLT ALUMINUM-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 26
Single-conductor Jacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.22	9	7	6	5	4
10	0.24	13	10	8	7	6
9	0.26	15	12	10	8	7
8	0.29	19	15	12	11	9
6	0.36	30	23	19	17	15
4	0.41	43	34	28	24	21
2	0.47	63	49	40	34	30
1	0.56	84	65	54	46	40
1/0	0.60	101	78	65	55	49
2/0	0.65	123	95	79	67	59
3/0	0.70	148	115	95	81	71
4/0	0.76	181	140	116	99	87
250	0.87	225	174	144	123	108
350	0.98	300	232	192	164	144
500	1.12	409	317	262	224	197
750	1.33	565	459	379	325	286
1000	1.49	682	591	488	419	368

Table 27
Triplexed Cable with Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.47	11	9	7	6	5
10	0.52	16	12	10	9	8
9	0.55	19	15	12	10	9
8	0.63	24	19	15	13	12
6	0.78	38	29	24	21	18
4	0.89	54	42	35	30	26
2	1.02	79	61	50	43	38
1	1.22	105	82	68	58	51
1/0	1.31	127	99	81	70	61
2/0	1.40	153	118	98	84	74
3/0	1.52	179	144	119	102	90
4/0	1.65	210	176	145	124	109
250	1.92	234	222	184	157	138
350	2.16	291	291	244	210	184
500	2.41	366	366	326	279	245
750	2.88	478	478	477	409	359

Table 28
Three-conductor Jacketed Cable with Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
12	0.59	14	11	9	8	7
10	0.64	19	15	12	11	9
9	0.67	23	18	15	13	11
8	0.75	29	22	18	16	14
6	0.94	46	35	29	25	22
4	1.05	64	50	41	35	31
2	1.18	86	70	58	50	44
1	1.38	101	92	76	65	57
1/0	1.47	116	111	91	78	69
2/0	1.56	134	132	109	93	82
3/0	1.68	155	155	132	113	99
4/0	1.87	179	179	165	141	124
250	2.10	200	200	200	172	151
350	2.34	247	247	247	227	199
500	2.63	308	308	308	305	268
750	3.16	396	396	396	396	394

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AMPACITIES OF 2001-5000 VOLT ALUMINUM-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C—AIR AMBIENT TEMPERATURE 40°C

Table 29▲
Single-conductor Shielded and Jacketed Cable

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
8	0.47	31	24	20	17	15
6	0.53	44	34	28	24	21
4	0.58	61	47	39	34	29
2	0.64	85	66	54	47	41
1	0.68	102	79	65	56	49
1/0	0.72	121	94	77	66	58
2/0	0.77	145	112	93	80	70
3/0	0.86	182	141	116	100	88
4/0	0.92	218	169	140	120	105
250	0.99	255	198	163	140	123
350	1.07	326	253	209	179	157
500	1.20	431	338	280	240	210
750	1.39	560	478	395	339	298
1000	1.54	673	609	503	431	379

Table 30
Triplexed Cable with Shielded and Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
8	1.01	39	30	25	21	19
6	1.15	56	43	36	31	27
4	1.26	77	60	49	42	37
2	1.39	104	83	68	59	52
1	1.47	121	98	81	70	61
1/0	1.56	139	117	97	83	73
2/0	1.66	164	140	116	99	87
3/0	1.86	185	176	146	125	110
4/0	1.99	214	212	175	150	132
250	2.13	237	237	204	175	153
350	2.32	294	294	262	225	198
500	2.60	367	367	352	301	265
750	3.00	470	470	470	426	374

Table 31
Three-conductor Jacketed Cable with Nonshielded and Nonjacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
8	0.92	35	27	23	19	17
6	1.00	48	38	31	27	23
4	1.10	67	52	43	37	32
2	1.23	95	73	61	52	46
1	1.32	114	88	73	63	55
1/0	1.41	132	106	88	75	66
2/0	1.50	151	127	105	90	79
3/0	1.62	174	154	127	109	96
4/0	1.80	201	192	158	136	119
250	1.95	222	222	186	160	140
350	2.13	274	274	241	207	181
500	2.42	340	340	327	281	246
750	2.88	432	432	432	409	359

Table 32
Three-conductor Jacketed Cable with Nonshielded and Jacketed Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*, Inches				
		1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
8	1.02	39	30	25	21	19
6	1.11	54	42	34	29	26
4	1.21	74	57	47	41	36
2	1.36	99	81	67	57	50
1	1.45	114	97	80	69	60
1/0	1.54	132	116	96	82	72
2/0	1.63	151	138	114	98	86
3/0	1.81	174	172	142	122	107
4/0	2.02	201	201	178	152	134
250	2.16	222	222	207	177	156
350	2.35	274	274	266	228	200
500	2.63	340	340	340	305	268
750	3.09	432	432	432	432	385

* See Section B.

▲ Revised 5-15-1979.

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AMPACITIES OF 15 000-VOLT COPPER- AND ALUMINUM-CONDUCTOR CABLES IN OPEN-TOP CABLE TRAYS
CONDUCTOR TEMPERATURE 90°C — AIR AMBIENT TEMPERATURE 40°C

Table 33▲
Single-conductor Shielded and Jacketed Cable, with Copper Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*; Inches 1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
2	0.90	151	117	96	83	73
1	0.95	179	138	114	98	86
1/0	0.99	207	162	134	115	101
2/0	1.04	238	191	158	135	119
3/0	1.09	274	224	186	159	140
4/0	1.14	318	265	219	188	165
250	1.19	352	299	247	212	186
350	1.30	434	386	319	273	240
500	1.45	543	515	426	365	320
750	1.65	698	698	588	504	443
1000	1.90	833	833	773	663	582

Table 34
Triplexed Cable with Shielded and Jacketed Copper Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*; Inches 1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
2	1.95	138	138	121	103	91
1	2.05	159	159	142	122	107
1/0	2.14	183	183	167	143	126
2/0	2.25	210	210	197	169	148
3/0	2.36	242	242	232	199	175
4/0	2.46	279	279	273	234	206
250	2.57	308	308	308	264	232
350	2.81	378	378	378	342	301
500	3.13	466	466	466	458	402
750	3.57	587	587	587	587	561

Table 35
Single-conductor Shielded and Jacketed Cable, with Aluminum Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*; Inches 1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
2	0.90	120	93	77	66	58
1	0.95	140	110	91	78	68
1/0	0.99	162	129	106	91	80
2/0	1.04	186	152	125	107	94
3/0	1.09	214	178	147	126	111
4/0	1.14	248	209	173	148	130
250	1.19	274	238	196	168	148
350	1.30	339	307	254	217	191
500	1.45	425	409	338	290	254
750	1.65	550	550	469	402	353
1000	1.90	660	660	621	532	468

Table 36
Triplexed Cable with Shielded and Jacketed Aluminum Conductors

Conductor Size, AWG or MCM	Cable Diameter, Inches	Calculated Depth of Cables in Tray*; Inches 1.0	1.5	2.0	2.5	3.0
		Ampacity, Amperes				
2	1.95	108	108	96	82	72
1	2.05	124	124	113	97	85
1/0	2.14	142	142	133	114	100
2/0	2.25	164	164	157	135	118
3/0	2.36	190	190	185	158	139
4/0	2.46	218	218	216	186	163
250	2.57	242	242	242	211	185
350	2.81	298	298	298	273	239
500	3.13	370	370	370	363	319
750	3.57	473	473	473	473	445

*See Section B.
▲Revised editorially.

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NEMA STANDARDIZATION

The purpose of NEMA Standards, their classification and status are set forth in certain clauses of the NEMA Bylaws, which are quoted below:

Purpose of Standards

National Electrical Manufacturers Association Standards are adopted in the public interest and are designed to eliminate misunderstandings between the manufacturer and the purchaser and to assist the purchaser in selecting and obtaining the proper product for its particular need. Existence of a National Electrical Manufacturers Association Standard does not in any respect preclude any member or nonmember from manufacturing or selling products not conforming to the standard.

(Bylaw—Art. V, Sec. 1)

Definition of a Standard

A standard of the National Electrical Manufacturers Association defines a product, process or procedure with reference to one or more of the following: nomenclature, composition, construction, dimensions, tolerances, safety, operating characteristics, performance, rating, testing, and the service for which they are designed.

(Bylaw—Art. V, Sec. 2, Subsection A)

Dimensions

Where dimensions are given for interchangeability purposes, alternate dimensions satisfying the other provisions of the standards publication may be capable of otherwise equivalent performance.

(NEMA Policy Memorandum 84-2, dated June 7, 1984)

Classes of Standards

National Electrical Manufacturers Association Standards are of two classes:

1. NEMA Standard, which relates to a product commercially standardized and subject to repetitive manufacture, which standard has been approved by at least 90 percent of the members of the Subdivision eligible to vote thereon;
2. Suggested Standard for Future Design, which may not have been regularly applied to a commercial product, but which suggests a sound engineering approach to future development, which standard has been approved by at least two-thirds of the members of the Subdivision eligible to vote thereon.

(Bylaw—Art. V, Sec. 2, Subsection B)

Authorized Engineering Information

Authorized Engineering Information consists of explanatory data and other engineering information of an informative character not falling within the classification of NEMA Standard or Suggested Standard for Future Design.

(Bylaw—Art. V, Sec. 6, 1st Sentence)

Official Standards Proposal

An Official Standards Proposal is an official draft of a proposed standard which is formally recommended to an outside organization(s) for consideration, comment and/or approval.

(Bylaw—Art. V, Sec. 4, Subsection A)

Identification of Status

Standards in NEMA Standards Publications are identified in the foreword or following each standard as "NEMA Standard" or "Suggested Standard for Future Design." These indicate the status of the standard. These words are followed by a date which indicates when the standard was adopted in its present form by the Association.

The material identified as "Authorized Engineering Information" and "Official Standards Proposal" is designated similarly.

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