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STANDARDS PUBLICATION NO. CG 1

nema

Manufactured Graphite/ Carbon Electrodes

NEMA

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION ■ 2101 L STREET, N.W., WASHINGTON, D.C. 20037

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NEMA STANDARDS PUBLICATION NO. CG 1-1993

MANUFACTURED GRAPHITE/CARBON ELECTRODES

Reaffirmed with Revisions, January 26, 1993

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Foreword

User needs were considered in the development of this Standards Publication by the Carbon and Manufactured Graphite Section of the National Electrical Manufacturers Association. The Section will periodically review it for any revisions necessary to keep it up to date with advancing technology. Proposed or recommended revisions should be submitted to:

Vice President, Engineering Department
National Electrical Manufacturers Association
2101 L Street, N.W.
Washington, D.C. 20037

NEMA Standards Publication No. CG 1-92 revises and supersedes CG 1-1982.

Scope

Section 1 of this Standards Publication covers lengths and diameters of cylindrical manufactured graphite and carbon electrodes for use in all types of electric arc furnaces.

Section 2 covers thread design, sizes and other pertinent details of the joining systems of cylindrical manufactured graphite and carbon electrodes most commonly used in electric arc furnaces.

Throughout this publication, the values stated in U.S. customary units are to be regarded as the standard.

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Section 1
LENGTHS AND DIAMETERS

1.1 GENERAL

For best results, because of differences in physical properties, indiscriminate mixing of electrodes and connecting pins from different sources should be avoided. Property value differences are due to the variety of raw materials or processing techniques.

1.2 LENGTHS

The length of manufactured graphite electrodes shall be in accordance with Table 1-1.

1.3 DIAMETERS

The diameter of electrodes shall be in accordance with Table 1-2. For DT type electrodes use Table 1-3.

Table 1-1
LENGTH OF GRAPHITE ELECTRODES

Nominal Length			Full Length		Under Full Length	
Inches*	mm	Exact Conv. to mm	inches*	mm	Inches*†	mm†
24	600	609.6	23 to 24	584 to 610	21 to 22	533 to 559
30	750	762.0	28 to 31	711 to 787	24 to 27	610 to 688
36	900	914.4	34 to 37	864 to 940	30 to 33	762 to 838
40	1000	1016.0	37 to 41	940 to 1041	32 to 36	813 to 914
48	1200	1219.2	44 to 49	1118 to 1245	38 to 43	965 to 1092
60	1500	1524.0	56 to 63	1422 to 1600	49 to 55	1245 to 1397
72	1800	1828.8	67 to 75	1702 to 1905	62 to 66	1575 to 1676
84	2100	2133.6	78 to 87	1981 to 2210	72 to 77	1829 to 1956
96	2400	2438.4	90 to 99	2286 to 2515	84 to 89	2134 to 2261
110	2700	2794.0	100 to 114	2540 to 2895	95 to 99	2413 to 2515

* Lengths shall be classified on the basis of the nearest inch. For example, an electrode measuring 67.5 inches shall be called a 68-inch electrode; an electrode measuring 67.4 inches shall be called a 67-inch electrode.

† Due to manufacturing variables, a small percentage of electrodes may have the lengths given in this column.

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Table 1-2
DIAMETER OF GRAPHITE AND CARBON ELECTRODES

Diameter									Nominal Length		
Nominal			Maximum		Minimum		At Low Spot*				
Inches	mm	Exact Conv. to mm	Inches	mm	Inches	mm	Inches	mm	Inchess	mm	Exact Conv. to mm
1-1/4	30	31.8	1.28	32.5	1.22	31.0	1.19	30.2	24	600	609.6
1-1/2	40	38.1	1.53	38.9	1.47	37.3	1.44	36.6	24	600	609.6
2	50	50.8	2.03	51.6	1.94	49.3	1.91	48.5	24 30 48	600 750 1200	609.6 762.0 1219.2
2-1/2	60	63.5	2.53	64.3	2.44	62.0	2.41	61.2	30	750	762.0
3	75	76.2	3.07	78.8	2.88	73.2	2.85	72.4	40	1000	1016.0
4	100	101.6	4.07	103.4	3.88	98.6	3.84	97.5	40 48	1000 1200	1016.0 1219.2
5-1/8	130	130.2	5.20	132.1	5.00	127.0	4.96	126.0	40	1000	1016.0
6	150	152.0	6.07	154.2	5.88	149.4	5.75	146.1	48 60 72	1200 1500 1800	1219.2 1524.0 1828.8
7	175	177.8	7.07	179.6	6.88	174.8	6.75	171.5	48 60 72	1200 1500 1800	1219.2 1524.0 1828.8
8	200	203.2	8.07	205.0	7.88	200.2	7.75	196.9	48 60 72	1200 1500 1800	1219.2 1524.0 1828.8
9	225	228.6	9.07	230.4	8.88	225.6	8.75	222.3	60 72	1500 1800	1524.0 1828.8
10	250	254.0	10.07	255.8	9.88	251.0	9.75	247.7	48 60 72	1200 1500 1800	1219.2 1524.0 1828.8
12	300	304.8	12.07	306.6	11.88	301.8	11.75	298.5	60 72	1500 1800	1524.0 1828.8
14	350	355.6	14.12	358.6	13.88	352.6	13.75	349.3	60 72	1500 1800	1524.0 1828.8
16	400	406.4	16.12	409.4	15.88	403.4	15.75	400.1	72	1800	1828.8
17	425	431.8	17.12	434.9	16.88	428.8	16.75	425.5	60 72	1500 1800	1524.0 1828.8

(Table 1-2 continued on Page 3)

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Table 1-2 cont.

DIAMETER OF GRAPHITE AND CARBON ELECTRODES

Diameter									Nominal Length		
Nominal			Maximum		Minimum		At Low Spot*				
Inches	mm	Exact Conv. to mm	Inches	mm	Inches	mm	Inches	mm	Inchess	mm	Exact Conv. to mm
18	450	457.2	18.12	460.3	17.88	454.2	17.75	450.9	60 72 96	1500 1800 2400	1524.0 1828.8 2438.4
20	500	508.0	20.12	511.1	19.88	505.0	19.75	501.7	60 72 84 96	1500 1800 2100 2400	1524.0 1828.8 2133.6 2438.4
22	550	558.8	22.12	561.9	21.88	555.8	21.75	552.5	72 84	1800 2100	1828.8 2133.6
24	600	609.6	24.12	612.7	23.88	606.6	23.75	603.3	72 84 96 110	1800 2100 2400 2700	1828.8 2133.6 2438.4 2794.0
26	650	660.4	26.12	663.6	25.88	657.2	25.75	654.1	96 110	2400 2700	2438.4 2794.0
28	700	711.2	28.12	714.3	27.88	708.2	27.75	704.9	96 110	2400 2700	2438.4 2794.0
30	750	762.0	30.12	765.1	29.88	759.0	29.50	749.3	110	2700	2794.0
35	875	889.0	35.12	892.1	34.88	886.0	34.50	876.3	110	2700	2794.0
40	1000	1016.0	40.12	1019.1	39.88	1013.0	39.50	1003.3	110	2700	2794.0
45	1150	1143.0	45.12	1146.1	44.88	1140.0	44.50	1130.3	110	2700	2794.0

* A low spot is a flat spot in a localized area untouched by the tool when the electrode is turned as compared reflects IEC "Nominal" designation with the remainder of the surface.

Table 1-3

DIAMETER OF DT-TYPE GRAPHITE ELECTRODES

Diameter								
Nominal			Maximum		Minimum		Nominal Length	
Inches	mm	Exact Conv. to mm	Inches	mm	Inches	mm	Inches	mm
2-1/2	60	63.5	2.375	60.3	2.358	59.9	30	750
3	75	76.2	2.938	74.6	2.922	74.2	40	1000
4	100	101.6	3.938	100.0	3.922	99.6	40	1000
5-1/8	130	130.2	5.031	127.8	5.016	127.4	40	1000
7	175	177.8	6.800	172.7	6.690	169.9	48	1200

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Section 2
JOINING SYSTEMS

2.1 CLASSES OF JOINING SYSTEMS

a. 0.250 pitch taper thread (see Table 2-1 and Figure 2-1).
b. 0.333 pitch taper thread (see Table 2-2 and Figure 2-2).
c. Dimensional Tolerances of Taper Thread Classes (see Table 2-3).
d. 0.125 pitch male-female thread (see Figure 2-3)
e. 0.250 pitch male-female thread (see Figure 2-4).
f. 60-degree flat thread (known in the industry as "National Coarse") (see Figure 2-5).
g. 2.000 pitch flat thread (see Figure 2-6).

Tables and Figures for Section 2 are displayed on following pages.

2.2 CONNECTING PIN SIZES

The nominal connecting pin size of the joining systems of cylindrical manufactured electrodes shall be in accordance with the applicable tables and figures in this section.

2.3 SOCKET SIZES

The nominal socket size of the joining systems of cylindrical manufactured electrodes shall be in accordance with the applicable tables and figures in this section.

2.4 THREAD DESIGN DETAIL

The thread design and detail of the joining systems of cylindrical manufactured electrodes shall be in accordance with the applicable tables and figures in this section.

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Table 2-1
JOINING SYSTEM—0.250 PITCH TAPER THREAD CLASS
FOUR THREADS PER INCH

Nominal Electrode Diameter	Connecting Pin		Recess*: E: Pin F: Socket	Electrode Socket			Pitch Diameter B
	Major Diameter A †	Length L †		Minor Diameter D	Depth ** S	Thread Length** T	
Inches 3	1.8125	3.0000	0.50	1.5635	1.6875	1.5000	1.6880
mm 75	46.04	76.20	13	39.71	42.86	38.10	42.88
Inches 4	2.7500	4.0000	0.50	2.5010	2.1875	2.0000	2.6255
mm 100	69.85	101.60	13	63.53	55.56	50.80	66.69
Inches 5⅛	3.1250	5.0000	0.50	2.8760	2.6875	2.5000	3.0005
mm 130	79.38	127.00	13	73.05	68.26	63.50	76.21
Inches 6	3.6250	5.5000	0.50	3.3760	2.9375	2.7500	3.5005
mm 150	92.08	139.70	13	85.75	74.61	69.85	88.91
Inches 7	4.2500	6.5000	0.50	4.0010	3.4375	3.2500	4.1255
mm 175	107.95	165.10	13	101.63	87.31	82.55	104.79
Inches 8	4.8125	7.0000	0.50	4.5635	3.6875	3.5000	4.6880
mm 200	122.24	177.80	13	115.91	93.66	88.90	119.08
Inches 20	10.6250	14.0000	0.50	10.3760	7.1875	7.0000	10.5005
mm 500	269.88	355.60	13	263.55	182.56	177.80	266.71
	10.6250	18.0000	0.50	10.3760	9.1875	9.0000	10.5005
	269.88	457.20	13	263.55	233.36	228.60	266.71
	11.7500	18.0000	0.50	11.5010	9.1875	9.0000	11.6255
	298.45	457.20	13	292.13	233.36	228.60	295.29
Inches 22	11.7500	18.0000	0.50	11.5010	9.1875	9.0000	11.6255
mm 550	298.45	457.20	13	292.13	233.36	228.60	295.29
Inches 24	12.5000	14.0000	0.50	12.2510	7.1875	7.0000	12.3755
mm 600	317.50	355.60	13	311.18	182.56	177.80	314.34
	12.5000	18.0000	0.50	12.2510	9.1875	9.0000	12.3755
	317.50	457.20	13	311.18	233.36	228.60	314.34
Inches 26	14.7500	18.0000	0.50	14.5010	9.1875	9.0000	14.6255
mm 650	374.65	457.20	13	368.33	233.36	228.60	371.49
Inches 28	14.7500	18.0000	0.50	14.5010	9.1875	9.0000	14.6255
mm 700	374.65	457.20	13	368.33	233.36	228.60	371.49

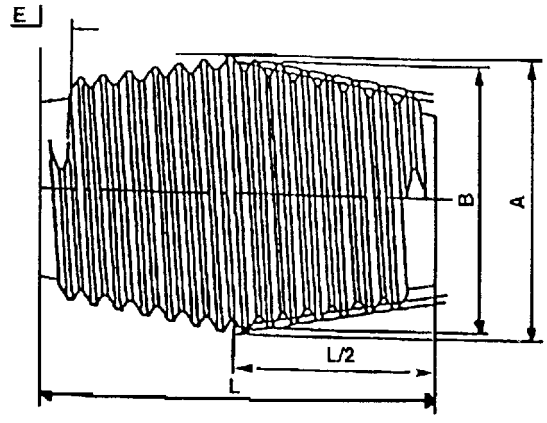
*Maximum Value

**Minimum Value

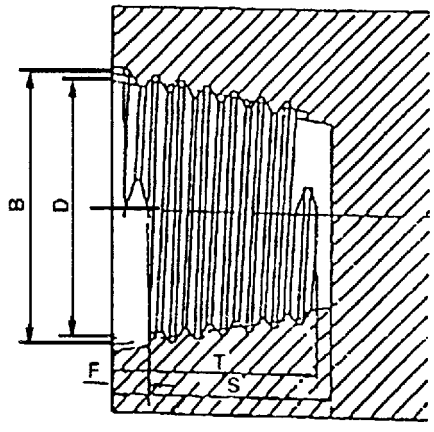
†Nominal Connecting Pin Size equals (A x L)

Note: See Figure 2-1.

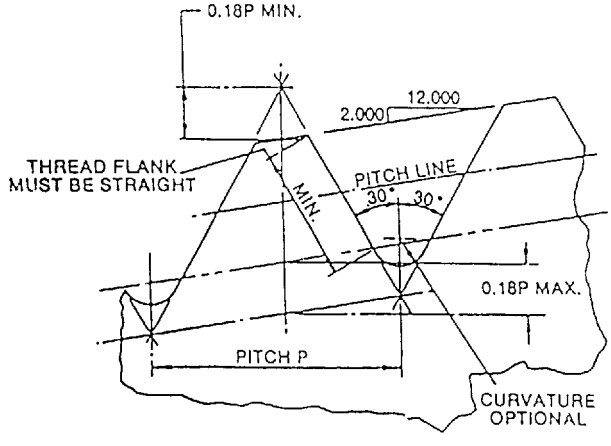
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CONNECTING PIN DETAIL



SOCKET DETAIL



TAPER THREAD DETAIL
0.250 PITCH

Figure 2-1
JOINING SYSTEM—0.250 PITCH TAPER THREAD CLASS

Note: See Table 2-1.

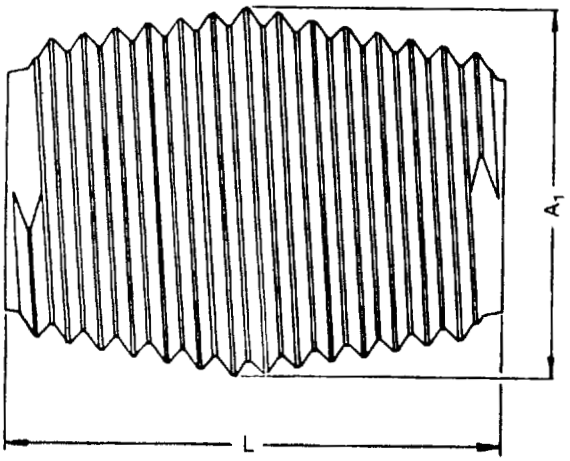
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Table 2-2
JOINING SYSTEM—0.333 PITCH TAPER THREAD CLASS THREE THREADS PER INCH

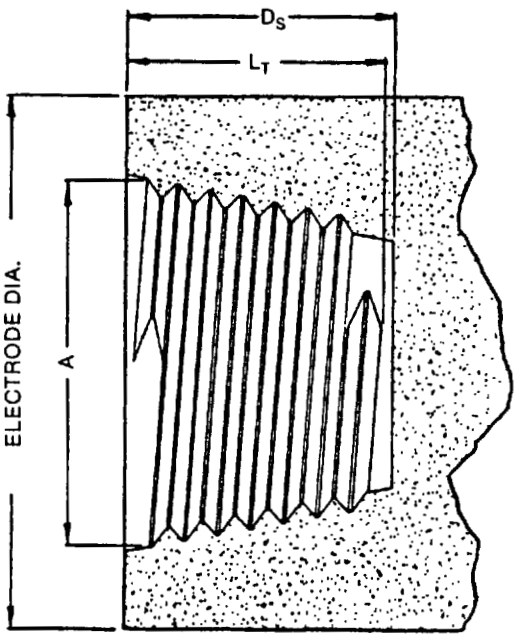
Nominal Electrode Diameter	Connecting Pin			Electrode Socket			
	Major Diameter A†	Length L†	Recess*: E: Pin F: Socket	Minor Diameter D	Depth** S	Thread Length** T	Pitch Diameter B
Inches 9	5.5000	8.0000	0.55	5.1680	4.1875	4.0000	5.3340
mm 225	139.70	203.20	14	131.27	106.36	101.60	135.48
Inches 10	5.5000	8.0000	0.55	5.1680	4.1875	4.0000	5.3340
mm 250	139.70	203.20	14	131.27	106.36	101.60	135.48
	6.1250	8.6667	0.55	5.7930	4.5209	4.3333	5.9590
	155.58	220.13	14	147.14	114.83	110.07	151.36
Inches 12	6.1250	8.6667	0.55	5.7930	4.5209	4.3333	5.9590
mm 300	155.58	220.13	14	147.14	114.83	110.07	151.36
	6.9750	10.6667	0.55	6.6430	5.5209	5.3333	6.8090
	177.17	270.93	14	168.73	140.23	135.47	172.95
Inches 14	6.9750	10.6667	0.55	6.6430	5.5209	5.3333	6.8090
mm 350	177.17	270.93	14	168.73	140.23	135.47	172.95
	8.5000	12.0000	0.55	8.1680	6.1875	6.0000	8.3340
	215.90	304.80	14	207.47	157.16	152.40	211.68
Inches 16	8.5000	12.0000	0.55	8.1680	6.1875	6.0000	8.3340
mm 400	215.90	304.80	14	207.47	157.16	152.40	211.68
	9.5000	14.0000	0.55	9.1680	7.1875	7.0000	9.3340
	241.30	355.60	14	232.87	182.56	177.80	237.08
Inches 17	9.5000	12.0000	0.55	9.1680	6.1875	6.0000	9.3340
mm 425	241.30	304.80	14	232.87	157.16	152.40	237.08
	9.5000	14.0000	0.55	9.1680	7.1875	7.0000	9.3340
	241.30	355.60	14	232.87	182.56	177.80	237.08
Inches 18	9.5000	12.0000	0.55	9.1680	6.1875	6.0000	9.3340
mm 450	241.30	304.80	14	232.87	157.16	152.40	237.08
	9.5000	14.0000	0.55	9.1680	7.1875	7.0000	9.3340
	241.30	355.60	14	232.87	182.56	177.80	237.08
	10.7500	14.0000	0.55	10.4180	7.1875	7.0000	10.5840
	273.05	355.60	14	264.62	182.56	177.80	268.83
Inches 20	10.7500	14.0000	0.55	10.4180	7.1875	7.0000	10.5840
mm 500	273.05	355.60	14	264.62	182.56	177.80	268.83
	10.7500	18.0000	0.55	10.4180	9.1875	9.0000	10.5840
	273.05	457.20	14	264.62	233.36	228.60	268.83

*Maximum Value
**Minumum Value
†Nominal Connecting Pin Size Equals (A × L)

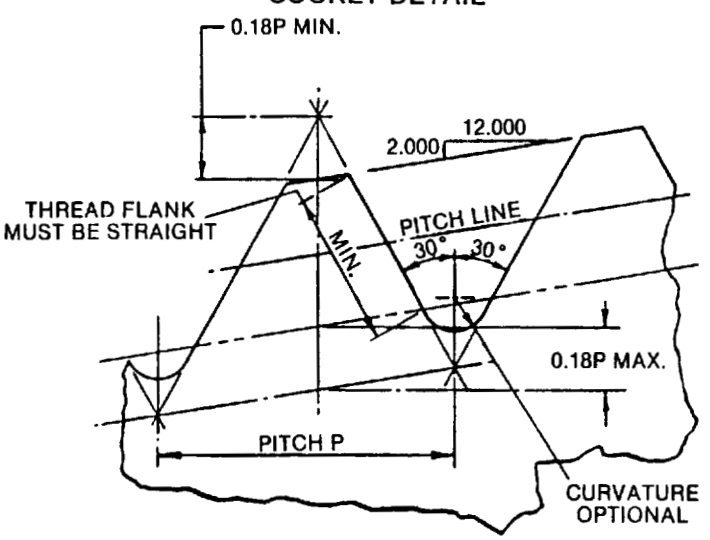
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CONNECTING PIN DETAIL



SOCKET DETAIL



TAPER THREAD DETAIL
0.333 PITCH

Figure 2-2
JOINING SYSTEM—0.333 PITCH TAPER THREAD CLASS

Note: See Table 2-2.

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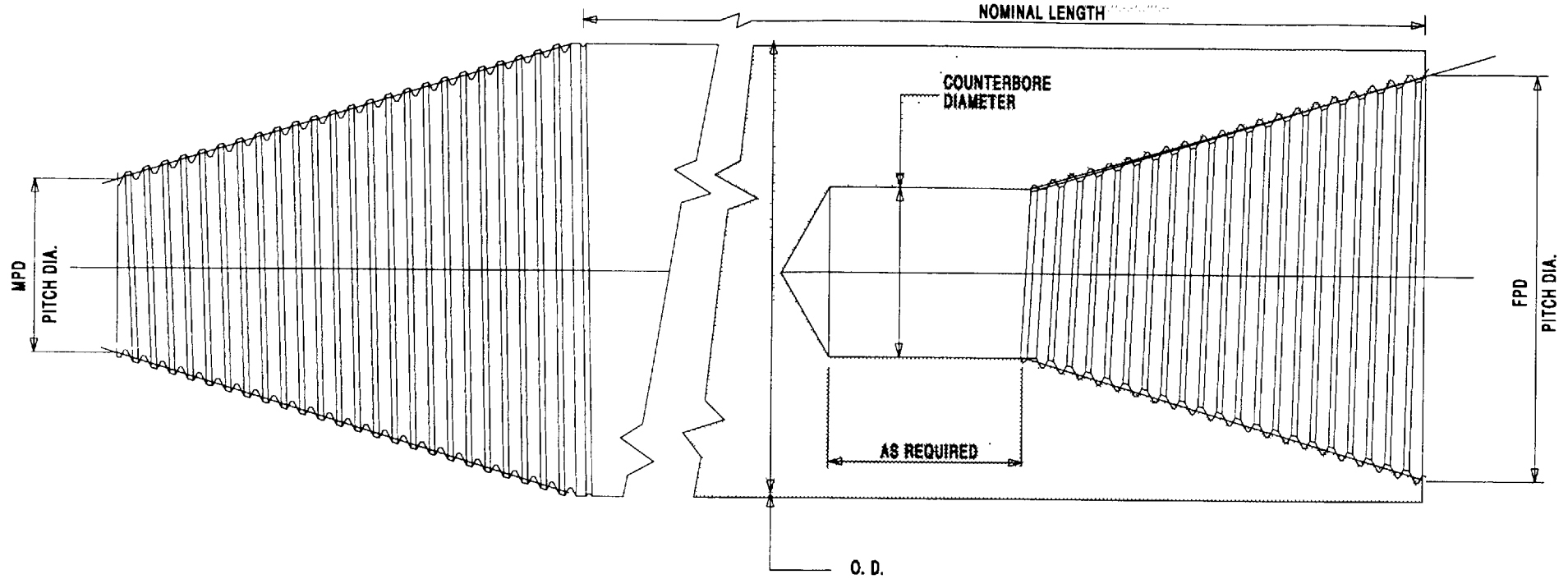
Table 2-3
DIMENSIONAL TOLERANCES OF TAPER THREAD CLASSES

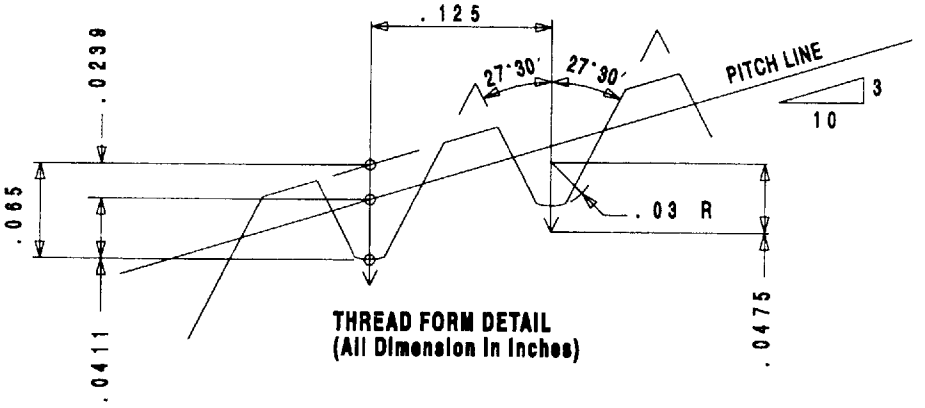
Nominal Electrode Diameter	Connecting Pin		Electrode Socket			
	Taper Angle (Minutes)	Length L	Pitch Diameter B	Taper Angle (Minutes)	Depth S	Thread Length T
Inches 3–28	+ 1.5′	+ 0.000	+ 0.020	+2.0′	+ 0.400	+ 0.400
	– 6.0′	– 0.120	– 0.000	– 2.0′	– 0.000	– 0.000
mm 75–700	+ 1.5′	+ 0.0	+ 0.5	+2.0′	+ 10.0	+ 10.0
	– 6.0′	– 3.0	– 0.0	– 2.0é	– 0.0	– 0.0

Note. Applies to Tables 2-1 and 2-2 and Figures 2-1 and 2-2

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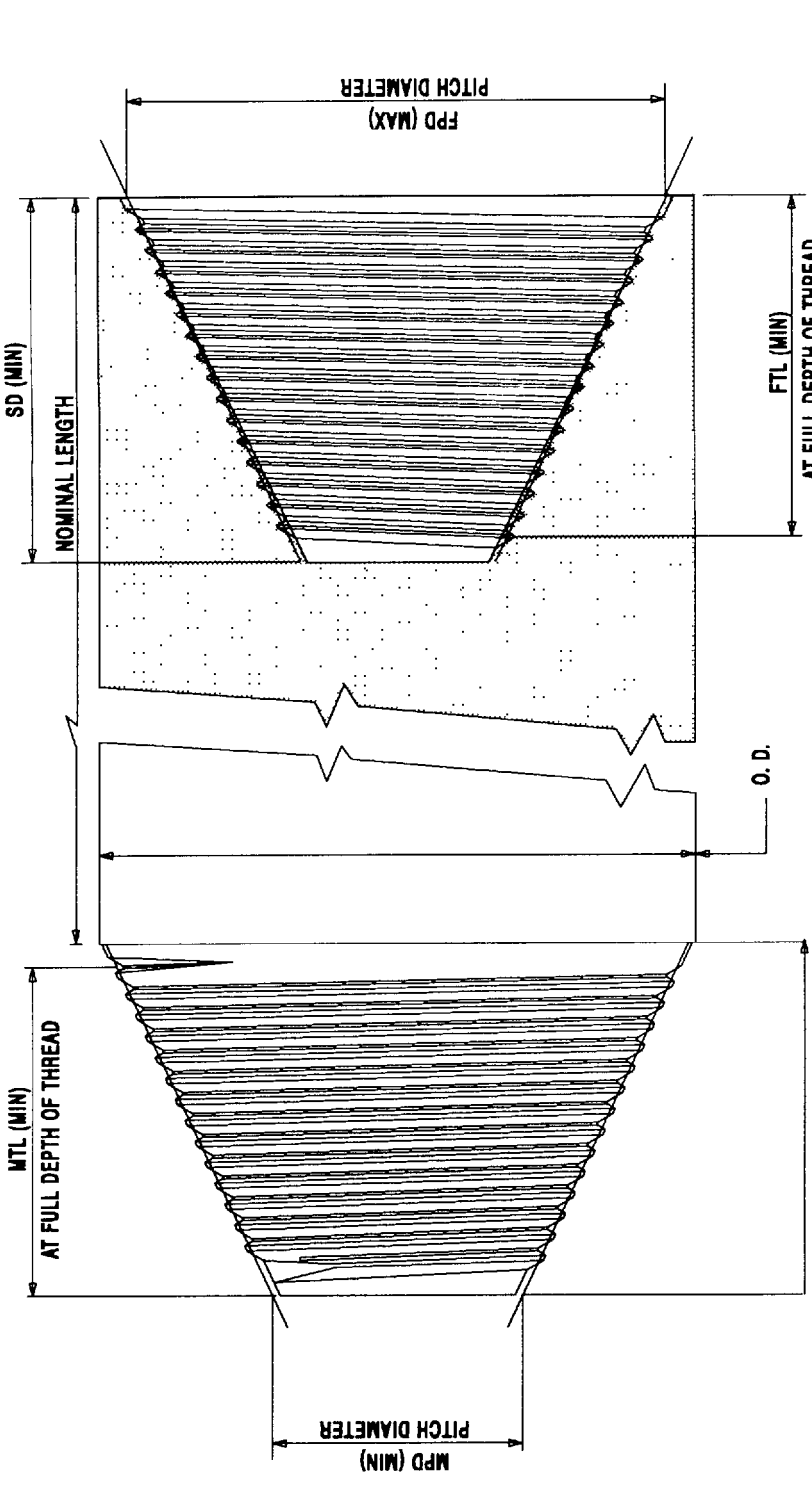


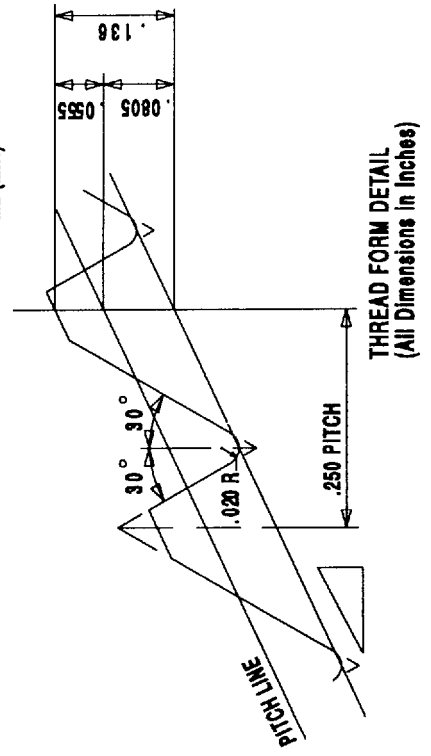


Nominal Diameter (O.D.)	Male-end Pitch Diameter (MPD)	Female-end Pitch Diameter (FPD)	Counterbore Diameter
3 inches 75mm	1.1728 29.789	2.6678 67.762	1.125 28.57
4 inches 100mm	1.1728 29.789	3.4803 88.400	1.125 28.57
5 1/8 inches 130mm	2.1454 54.493	4.6054 116.978	2.098 53.29
6 inches 150mm	2.6482 67.264	5.4804 139.202	2.098 53.10

Figure 2-3
JOINING SYSTEM—0.125 PITCH MALE-FEMALE THREAD CLASS

Note: Lengths shall be defined as the unthreaded full-turned diameter as shown in Table 1-1.





Nominal Diameter (O.D.)	Male Length (ML)	Male Thread Length (MTL)	Male-end Pitch Diameter (MPD)	Socket Depth (SD)	Female Thread Length (FTL)	Female-end Pitch Diameter (FPD)
7 inches	4.813	3.915	2.931	4.313	4.010	6.300
175 mm	122.24	99.44	74.45	109.54	101.85	160.02
8 inches	4.688	4.415	3.329	4.813	4.510	7.167
200 mm	119.06	112.14	84.55	122.24	114.55	182.04
9 inches	5.188	4.915	3.779	5.313	5.010	8.080
225 mm	131.76	124.81	95.99	134.94	127.25	205.23
10 inches	5.688	5.415	4.112	5.813	5.510	8.880
250 mm	144.46	137.54	104.44	147.64	139.95	225.55

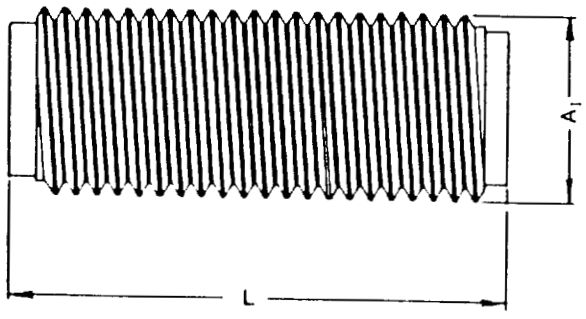
Figure 2-4
JOINING SYSTEM—0.250 PITCH MALE-FEMALE THREAD CLASS

Note: Lengths shall be defined as the unthreaded full-turned diameter as shown in Table 1-1.

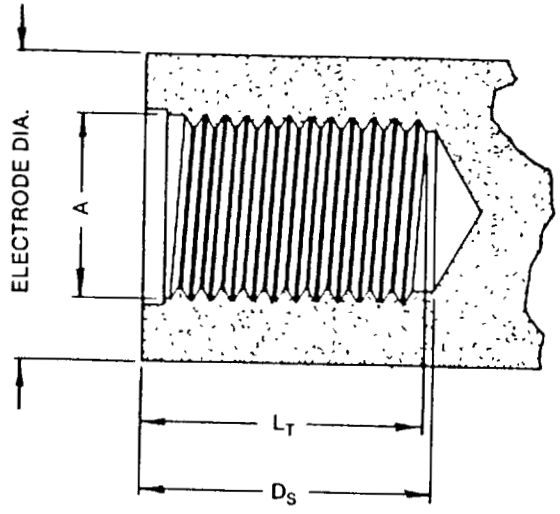
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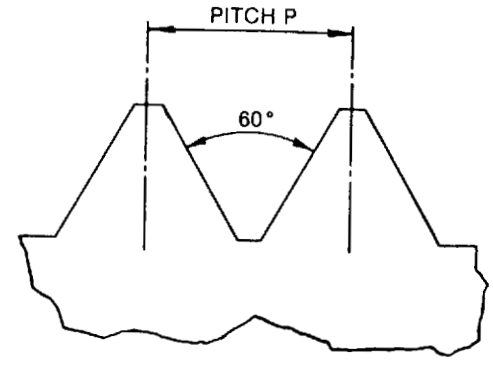
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CONNECTING PIN DETAIL



SOCKET DETAIL



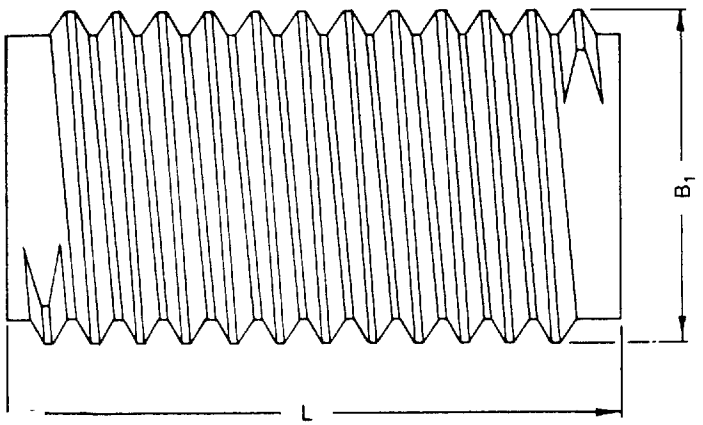
60° FLAT THREAD DETAIL

	Nominal Electrode Diameter	Connecting Pin: Nominal Pin Size "A_1" × "L"	Connecting Pin: Overall Length "L" Maximum	Connecting Pin: Overall Length "L" Minimum	Electrode Socket: Depth "D_s" Maximum	Electrode Socket: Depth "D_s" Minimum	Electrode Socket: Length of Thread "L_T" Maximum	Electrode Socket: Length of Thread "L_T" Minimum	Thread Detail: Nominal Diameter "A"	Thread Detail: Pitch of Thread "P"	Thread Detail: Threads Per Inch
Inches	1-1/4	0.750 × 2.00	2.000	1.969	1.187	1.062	1.157	1.000	0.750	0.100	10
mm	30	19.05 × 50.80	50.80	50.01	30.16	26.99	29.39	25.40	19.05	2.540	
Inches	1-1/2	0.750 × 2.00	2.000	1.969	1.187	1.062	1.157	1.000	0.750	0.100	10
mm	40	19.05 × 50.80	50.80	50.01	30.16	26.99	29.39	25.40	19.05	2.540	
Inches	2	1.250 × 3.00	3.000	2.969	1.687	1.562	1.657	1.500	1.250	0.1428	7
mm	50	31.75 × 76.20	76.20	75.41	42.86	39.69	42.09	38.10	31.75	3.627	
Inches	2-1/2	1.500 × 4.00	4.000	3.969	2.187	2.062	2.157	2.000	1.500	0.1667	6
mm	60	38.10 × 101.60	101.60	100.61	55.56	52.39	54.79	50.80	38.10	4.234	

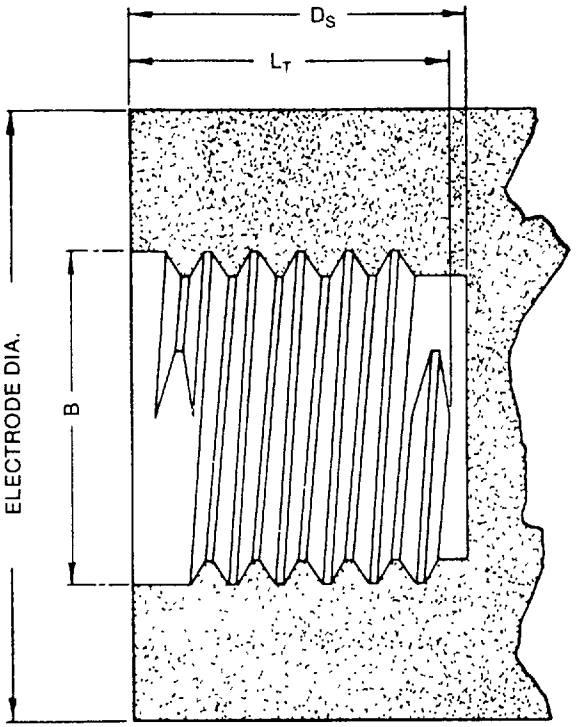
Contour of base of socket optional.

Figure 2-5
JOINING SYSTEM-60-DEGREE FLAT THREAD (NATIONAL COARSE) CLASS

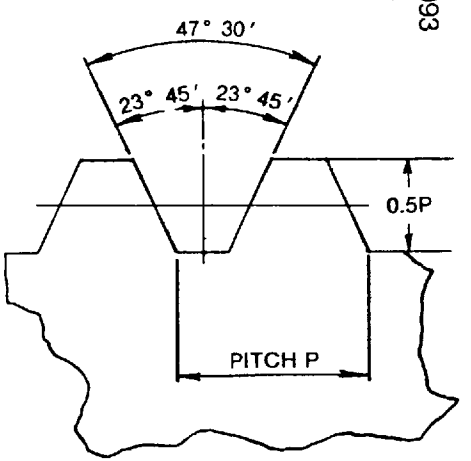
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CONNECTING PIN DETAIL



SOCKET DETAIL



FLAT THREAD DETAIL
2.000 PITCH

	Nominal Electrode Diameter	Connecting Pin: Nominal Pin Size † "B_1" × "L"	Connecting Pin: Overall Length "L" Maximum	Connecting Pin: Overall Length "L" Minimum	Electrode Socket: Depth "D_s" Maximum	Electrode Socket: Depth "D_s" Minimum	Electrode Socket: Length of Thread "L_T"* Maximum	Electrode Socket: Length of Thread "L_T"* Minimum	Thread Detail: Nominal Diameter "B"	Thread Detail: Pitch of Thread "P"
Inches	30	15.320 × 22.5	22.563	22.250	11.563	11.375	10.250	10.000	15.320	2.000
mm	750	389.13 × 571.5	573.09	565.15	293.70	288.92	260.35	254.00	389.13	50.8
Inches	35	18.500 × 26.5	26.563	26.250	13.563	13.375	12.250	12.000	18.500	2.000
mm	875	469.90 × 673.1	674.69	666.75	344.50	339.72	322.15	304.80	469.90	50.8
Inches	40	21.000 × 28.0	28.063	27.750	14.313	14.125	13.000	12.750	21.000	2.000
mm	1000	533.40 × 711.2	712.79	704.85	363.55	358.78	330.20	323.85	533.40	50.8
Inches	45	23.000 × 30.0	30.063	29.750	15.313	15.125	14.000	13.750	23.000	2.000
mm	1150	584.20 × 762.0	763.59	755.65	388.95	384.18	355.60	349.25	584.20	50.8

† Diameter of connecting pin expressed as pitch diameter.
* Maximum thread length on connecting pin is twice the minimum L_T.

Figure 2-6
JOINING SYSTEM—2.000 PITCH FLAT THREAD (MODIFIED ACME) CLASS

APPENDIX

A comparison of taper thread classes currently included in NEMA, Japanese Industrial Standard (JIS), and International Electrotechnical Commission (IEC) documents is shown below for information purposes.

Table A-1
STANDARDS COMPARISON

Nominal Joint Size Diameter X Length	Threads per Inch	Nominal Electrode Diameter		
		NEMA CG-1	JIS R7201	IEC 239
Inches 1-13/16 × 3	4	3	3	3
mm 46.08 × 76.20		75	75	75
Inches 2-3/4 × 4	4	4	4	4
mm 69.85 × 101.60		100	100	100
Inches 3-1/8 × 5	4	5-1/8	5-1/8	5-1/8
mm 79.38 × 127.00		130	130	130
Inches 3-5/8 × 5-1/2	4	6	6	6
mm 92.08 × 139.70		150	150	150
Inches 4-1/4 × 6-1/2	4	7	7	7
mm 107.95 × 165.10		175	175	175
Inches 4-13/16 × 7	4	8	8	8
mm 122.24 × 177.80		200	200	200
Inches 5-1/2 × 7	4			9
mm 139.70 × 177.80				225
Inches 5-1/2 × 8	3	9, 10	9	9
mm 139.70 × 203.20		225, 250	225	225
Inches 5-1/2 × 8	4		9	
mm 139.70 × 203.20			225	
Inches 6 × 7-1/2	4			10
mm 152.40 × 190.50				250
Inches 6-1/8 × 8.667	3	10, 12	10	10
mm 155.58 × 220.13		250, 300	250	250
Inches 7 × 8-1/2	4			12
mm 177.80 × 215.90				300
Inches 6.9750 × 10.667	3	12, 14	12	12
mm 177.17 × 270.94		300, 350	300	300
Inches 8 × 10	4			14
mm 203.20 × 254.00				350
Inches 8-1/2 × 12	3	14, 16	14	14, 16
mm 215.90 × 304.80		350, 400	350	350, 400
Inches 8-1/2 × 14	3			
mm 215.90 × 355.60				*
Inches 8-3/4 × 12	4			16
mm 222.25 × 304.80				400

(Appendix Table continued on Page 16)

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Table A-1 cont.
STANDARDS COMPARISON

Nominal Joint Size Diameter X Length	Threads per Inch	Nominal Electrode Diameter NEMA CG-1	JIS R7201	IEC 239
Inches 8-3/4 × 14	4			16
mm 222.25 × 355.60				400*
Inches 9-1/2 × 12	3	17		
mm 241.30 × 304.80		475		
Inches 9-1/2 × 12	4			18
mm 241.30 × 304.80				450
Inches 9-1/2 × 13.333	3	18	16, 18	16, 18
mm 241.30 × 338.70		450	400, 450	400, 450
Inches 9-1/2 × 14	3	16, 17, 18		
mm 241.30 × 355.60		400, 425, 450		
Inches 9-1/2 × 14	4			18
mm 241.30 × 355.60				450*
Inches 10-5/8 × 14	4	20		20
mm 269.88 × 355.60		500		500
Inches 10-5/8 × 18	4	20		20
mm 269.88 × 457.20		500		500*
Inches 10-3/4 × 14	3	18, 20	18, 20, 22	18, 20
mm 273.05 × 355.60		450, 500	450, 500, 550	450, 500
Inches 10-3/4 × 18	3	20		
mm 273.05 × 457.20		500		
Inches 11-3/4 × 14	4			22
mm 298.45 × 355.60				550
Inches 11-3/4 × 14.667	3		22, 24	22
mm 298.45 × 372.50			550, 600	550*
Inches 11-3/4 × 18	4	20,22		22
mm 298.45 × 457.20		500, 550		550*
Inches 12-1/2 × 14	4	24	24	24
mm 317.50 × 355.60		600	600	600
Inches 12-1/2 × 18	4	24		24
mm 317.50 × 457.20		600		600*
Inches 14 × 18	4			26
mm 355.60 × 457.20				650
Inches 14-3/4 × 18	4	26, 28		28
mm 374.65 × 457.20		650, 700		700

*As of September 1991, these items have been under further review by the IEC.

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NEMA STANDARDIZATION BACKGROUND

The purpose of NEMA Standards, their classification, and status are set forth in certain clauses of the NEMA *Standardization Policies and Procedures* manual and are referenced below:

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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 their particular needs. 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.

(Standardization Policies and Procedures, p. 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, dimensions, tolerances, safety, operating characteristics, performance, rating, testing, and the service for which they are designed.

(Standardization Policies and Procedures, p. 2)

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.

(Standardization Policies and Procedures, p. 8)

Categories of Standards

National Electrical Manufacturers Association Standards are of three classes, which have received the affirmative vote of at least two-thirds of the Subdivision votes cast in the affirmative or negative:

1. NEMA Standard, which relates to a product, process, or procedure commercially standardized and subject to repetitive manufacture.
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.
3. Adoptive Standard, which is adopted in whole or in part from the standards of another organization, either domestic, regional, or international.

(Standardization Policies and Procedures, pp. 7 & 16)

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, which standard has received the affirmative vote of at least two-thirds of the Subdivision votes cast in the affirmative or negative.

(Standardization Policies and Procedures, pp. 7 & 16)

Identification of Status

Standards in NEMA Standards Publications are identified as "NEMA Standard," "Suggested Standard for Future Design," or "Adoptive Standard." These indicate the status of the standard. A statement incorporating the auxiliary verb "shall" indicates that compliance with a requirement is mandatory for compliance with the standard. These classes of standards are identified in the foreword or throughout the text.

The material identified as "Authorized Engineering Information" is designated similarly. Statements incorporating other auxiliary verbs such as "should," "may," etc. refer to authorized engineering information and not to procedures required for compliance with the standard.

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