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19 April 1993 for
NEMA TC 14-1984
(R 1986)
1984

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Title of Document: Filament-Wound Reinforced Thermosetting Resing Conduit and Fittings

Date of Specific Issue Adopted: 1984 (No specific date)

Releasing Non-Government Standards Body: National Electrical Manufacturers Association

Military Coordinating Activity:
Navy - YD

(Project 5975-1117)

FSC 5975

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STD.NEMA TC 14-ENGL 1984 ■ 6470247 0524433 466 ■

NEMA STANDARDS PUBLICATION

NEMA TC 14

FILAMENT WOUND REINFORCED THERMOSETTING RESIN CONDUIT AND FITTINGS

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NEMA Standards Publication TC 14-1984 (R1986, R1997)

Filament Wound Reinforced Thermosetting Resin Conduit and Fittings

Published by:

National Electrical Manufacturers Association
1300 North 17th Street
Rosslyn, VA 22209

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TABLE OF CONTENTS

		Page
	FOREWORD	i
	SCOPE	ii
Section 1	REFERENCED STANDARDS & DEFINITIONS	
	General	1
	Referenced Standards and Publications	1
	Definitions	1
Section 2	MATERIALS, APPLICATIONS AND DIMENSIONS	
	General	3
	Product Descriptions	3
	Applications	3
	Adhesive Requirements	3
	Nominal Sizes	3
	Dimensions and Tolerance	3
	PART A—Dimensions Based on Outside Diameters of Iron Pipe Size	
	Conduit	6
	Fittings	7
	PART B—Dimensions Based on Inside Diameters	
	Conduit	12
	Fittings	13
Section 3	PERFORMANCE REQUIREMENTS	
	Workmanship	17
	Joining Methods	17
	Heat Distortion (Referee Test)	17
	Tensile Strength	17
	Fire Resistance (Flammability-Referee Test)	17
	Stiffness (F/△Y)	17
	Impact Resistance	17
	Joint Pullout—Referee Test Only	18
Section 4	TEST METHODS	
	Conditioning Test Specimens and Test Conditions	19
	Conduit Stiffness Test	19
	Impact Resistance Test	19
Section 5	MARKING	20
Section 6	REQUIREMENTS FOR REPORTING ENGINEERING DATA	
	Recommended Maximum Beam Deflection	21
	Beam Deflection/Support Spacing Calculation Method	21
	Bending Radius Calculation	21

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TABLES

Table 2-1A	Conduit Dimensions	6
Table 2-2A	Dimensions for Conduit Joints and Fittings	7
Table 2-3A	Couplings	8
Table 2-4A	Terminal Adapters	8
Table 2-5A	Expansion Joints (Typical)	9
Table 2-6A	End Bells—Socket Type	9
Table 2-7A	Elbows—Non-Tapered	10
Table 2-8A	Split Anchor Rings	10
Table 2-1B	Conduit Dimensions	12
Table 2-2B	Dimensions for Conduit Joints and Fittings	13
Table 2-3B	Couplings	14
Table 2-4B	Terminal Adapters	14
Table 2-5B	Expansion Joints (Typical)	15
Table 2-6B	End Bells—Socket Type	15
Table 2-7B	Elbows—Non-Tapered	16
Table 2-8B	Split Anchor Rings	16
Table 3-1	Minimum Stiffness (F/△Y)	17
Table 3-2	Minimum Impact Resistance	18
Table 3-3	Joint Pullout Resistance	18

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Foreword

The purpose of this standards publication for filament-wound reinforced thermosetting resin conduit (for both underground and above-ground installation) is:

1. To list dimensions and other significant requirements.
2. To set forth the minimum properties and performance requirements of this product and to assist the user in selecting the proper product for a particular need.
3. To list typical fittings and adapters for use with the conduit.

User needs have been considered throughout the development of these standards. Test methods and performance values have been related as closely as possible to end-use applications.

The Plastic Conduit, Duct and Accessories Section of NEMA, through its members, works closely with such organizations as the American Society for Testing and Materials, appropriate government agencies, and others in the periodic review and revision of these standards for any changes necessary to keep them up-to-date with advancing technology. Proposed or recommended revisions should be submitted to:

Manager, Engineering Department
National Electrical Manufacturers Association
2101 L Street, N.W., Suite 300
Washington, D.C. 20037

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Scope

This standard covers conduit employing filament wound reinforced thermosetting resins as defined in 1.2.2 and 1.2.3.

Two Series of Conduit and Fitting Dimensions are included as follows:

PART A— Dimensions Based on Outside Diameters of Iron Pipe Size (Corresponding to standard utility conduit i.e., 2.375″, 3.500″, 4.500″, 5.563″, and 6.625″)

PART B— Dimensions Based on Inside Diameters (even inch—i.e., 2″, 3″, 4″, 5″, and 6″)

Note: The values in U.S. customary units are to be regarded as the standard.

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FILAMENT-WOUND REINFORCED THERMOSETTING RESIN CONDUIT AND FITTINGS

Section 1

REFERENCED STANDARDS AND DEFINITIONS

1.1 GENERAL

The product is designed for installation below and above ground as a raceway for electrical and communications wire and cable.

NEMA Standard 7-12-1984.

1.2 REFERENCED STANDARDS AND PUBLICATIONS

In this publication, reference is made to the following publications. Copies are available from the indicated source.

American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 10103

F 412-82	*Standard Definition of Terms Relating to Plastic Piping Systems*
D 618-61 (R1981)	*Conditioning Plastics and Electrical Insulating Materials for Testing*
D 648-82	*Test Method for Deflection Temperature of Plastics Under Flexural Load*
D 883-83	*Definitions of Terms Relating to Plastics*
D 1600-83	*Abbreviations of Terms Relating to Plastics*
D 2105-67 (R1979)	*Test Method for Longitudinal Tensile Properties of Reinforced Thermosetting Plastic Pipe and Tube*
D 2122-81	*Determining Dimensions of Thermoplastic Pipe and Fittings*
D 2412-77	*Test for External Loading Properties of Plastic Pipe by Parallel-Plate Loading*
D 2444-80	*Test for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)*
D 2517-81	*Reinforced Epoxy Resin Gas Pressure Pipe and Fittings*
D 2749-68 (R1979)	*Standard Symbols for Dimensions of Plastic Pipe Fittings*
D 3567-77	*Determining Dimensions of Reinforced Thermosetting Resin Pipe (RTRP) and Fittings*

Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, IL 60062

UL 651-1981 (Section Flame)	*Rigid Nonmetallic Electrical Conduit*

National Electrical Manufacturers Association
2101 L Street, N.W., Suite 300
Washington, D.C. 20037

TCB 3-1976	*Users Manual for the Installation of Underground Plastic Duct*

1.3 DEFINITIONS

Definitions are in accordance with ASTM Definitions D 883 *Terms Related to Plastics;* and ASTM Abbreviations D 1600, *Terms Relating to Plastics,* and F 412 *Standard Definitions of Terms Relating to Plastic Piping Systems,* unless otherwise indicated.

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1.3.1 *Reinforced Thermosetting Resin Conduit* is a tubular product containing non-metallic reinforcement embedded in or surrounded by cured thermosetting resin. The composite structure shall be permitted to contain fillers, mixotropes, pigments, dyes, or other additives. Thermoplastic or thermosetting liners or coatings shall be permitted to be included.

1.3.2 *Filament Winding* is a process used to manufacture tubular conduit by winding continuous non-metallic strand roving or roving tape onto the outside of a mandrel in a predetermined pattern under controlled tension. The roving shall be saturated with liquid resin or pre-impregnated with partially cured resin. Subsequent polymerization of the resin system often requires applications of heat. The inside diameter (ID) of the finished conduit is fixed by the mandrel outside diameter (OD). The outside diameter (OD) of the finished conduit is determined by the amount of material that is wound on the mandrel.

NEMA Standard 7-12-1984.

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Section 2
MATERIALS, APPLICATIONS AND DIMENSIONS

2.1 GENERAL

The resins, reinforcements, colorants, fillers and other materials, when combined as a composite structure, shall produce a conduit that meets the dimensional and performance requirements of this standard.

NEMA Standard 7-12-1984.

2.2 PRODUCT DESCRIPTION

The product is a non-metallic reinforced thermosetting resin conduit.

2.2.1 Type SW—Standard wall

2.2.2 Type HW—Heavy wall

NEMA Standard 7-12-1984.

2.3 APPLICATIONS

2.3.1 Type SW

For exposed applications when supported as recommended by the manufacturer. Underground installation with or without concrete encasement shall be permitted in accordance with manufacturers' instructions.

2.3.2 Type HW

For exposed applications with extended supports as recommended by the manufacturer. For direct burial in single or multiple configuration in accordance with NEMA TCB-2 1976 underground conduit practice.

NEMA Standard 7-12-1984.

2.4 ADHESIVE REQUIREMENTS

Adhesive used to join thermosetting resin conduit and fittings shall be suitable for use with the conduit and fittings and shall meet the requirements listed in 2.4.1 and 2.4.2.

2.4.1 Adhesive Test

All adhesives shall have a minimum ultimate shear strength of 500 psi when tested in accordance with ASTM D-2517.

2.4.2 Adhesive Kits

Each kit shall contain the necessary components and instruction sheets which shall include information regarding cure time, pot life, and other data deemed necessary

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2.5 NOMINAL SIZES

The nominal sizes of the conduit shall be: 4, 5, and 6 inches for Type SW and 2, 3, 4, 5, and 6 inches for Type HW.

NEMA Standard 7-12-1984.

2.6 DIMENSIONS AND TOLERANCES

Dimensions of each size of conduit shall be in accordance with either Table 2-1A or Table 2-1B.

2.6.1 Diameter

The average diameter at any cross-section on the length of the conduit shall be the average of the maximum and minimum diameters of that cross-section, or as measured by the use of a vernier circumferential tape in accordance with Paragraph 7 of ASTM D-3567.

2.6.2 Wall Thickness

The actual wall thickness shall be that required to meet the performance requirements of this standard. Nominal wall thicknesses are shown in either Table 2-1A or 2-1B, measured in accordance with Paragraph 5 of ASTM D-3567.

2.6.3 Out-of-Roundness

The maximum I.D. out-of-roundness shall be shown in Table 2-1A or 2-1B, measured in accordance with Paragraph 5 of ASTM D-3567.

2.6.4 Conduit Length

The specified length shall be the overall length including the belled end or attached coupling. Factory-joined lengths shall be permitted.

2.6.5 Joints and Fittings

The dimensions for joints and fittings for joining tapered or untapered conduit shall be as shown in Table 2-2A or Table 2-2B.

2.6.6 Couplings for Joining Conduit

Table 2-3A or Table 2-3B contains dimensions which shall be used for couplings designed for joining of tapered or untapered conduit.

2.6.7 Terminal Adapters

Table 2-4A or Table 2-4B contains dimensions which shall be used for terminal adapters designed for adhesive joining to untapered conduit.

2.6.8 Expansion Joints

Dimensions for typical expansion joints shall be as shown in Table 2-5A or Table 2-5B.

2.6.9 Plain End Elbows

Table 2-6A or Table 2-6B contains dimensions which shall be used for plain end elbows.

2.6.10 End Bells

Table 2-7A or Table 2-7B contains dimensions which shall be used for end bells.

2.6.11 Split Anchor Rings

Table 2-8A or Table 2-8B contains dimensions which shall be used for split anchor rings.

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PART A

PART A
Dimensions Based on Outside Diameters of Iron Pipe Size

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Table 2-1A
CONDUIT DIMENSIONS

PART A

Type SW (Standard Wall) Inches

Nominal Size	Outside Diameter		Minimum Inside Diameter	Maximum Out-Of-Roundness (I.D.)*	Nominal Wall Thickness
	Average	Tolerance			
2	...	...	...	...	...
3	...	...	...	...	...
4	4.500	+0.028 −0.018	4.320	0.100	.070
5	5.563	+0.028 −0.018	5.380	0.100	.070
6	6.545	+0.028 −0.018	6.380	0.100	.070

Type SW (Standard Wall) Millimeters

Nominal Size	Outside Diameter		Minimum Inside Diameter	Maximum Out-Of-Roundness (I.D.)*	Nominal Wall Thickness
	Average	Tolerance			
2	...	...	...	...	...
3	...	...	...	...	...
4	114.30	+0.711 −0.457	109.73	2.54	1.78
5	141.30	+0.711 −0.457	136.65	2.54	1.78
6	166.24	+0.711 −0.457	162.05	2.54	1.78

Type HW (Heavy Wall) Inches

Nominal Size	Outside Diameter		Minimum Inside Diameter	Maximum Out-Of-Roundness (I.D.)*	Nominal Wall Thickness
	Average	Tolerance			
2	2.375	+0.028 −0.018	2.200	0.060	.070
3	3.500	+0.028 −0.018	3.310	0.080	.070
4	4.540	+0.028 −0.022	4.320	0.100	.090
5	5.643	+0.034 −0.028	5.380	0.100	.110
6	6.625	+0.034 −0.028	6.380	0.100	.110

Type HW (Heavy Wall) Millimeters

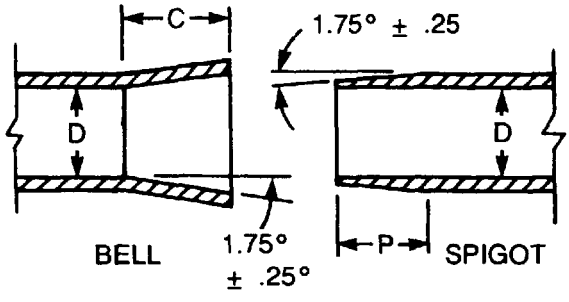
Nominal Size	Outside Diameter		Minimum Inside Diameter	Maximum Out-Of-Roundness (I.D.)*	Nominal Wall Thickness
	Average	Tolerance			
2	60.33	+0.711 −0.457	55.88	1.52	1.78
3	88.90	+0.711 −0.457	84.07	2.03	1.78
4	115.32	+0.711 −0.559	109.73	2.54	2.29
5	143.33	+0.864 −0.711	136.65	2.54	2.79
6	168.28	+0.864 −0.711	162.05	2.54	2.79

*Out of roundness is defined as maximum inside diameter minus minimum inside diameter.

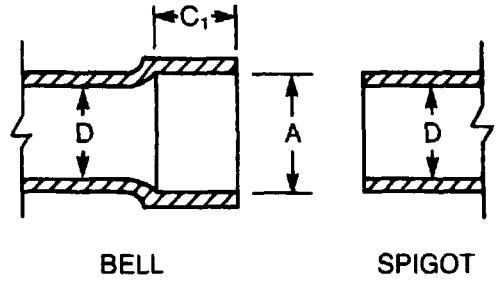
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Table 2-2A
DIMENSIONS FOR CONDUIT JOINTS AND FITTINGS

TAPERED JOINT—SMOOTH OR THREADED



UNTAPERED JOINT—SMOOTH



Dimensions (inches)

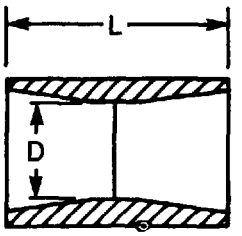
Nominal Size & Type	A		C	C_1	D	P
	Min.	Tol.	Min.	Min.	Min.	Min.
2 HW	2.400	+0.010	1.625	2.000	2.200	1.300
3 HW	3.530	+0.012	1.825	2.125	3.310	1.300
4 SW	4.535	+0.014	2.290	2.250	4.320	1.300
4 HW	4.575	+0.014	2.375	2.250	4.320	1.950
5 SW	5.615	+0.016	2.290	2.500	5.380	1.300
5 HW	5.695	+0.016	2.500	2.500	5.380	2.610
6 SW	6.610	+0.018	2.290	2.500	6.380	1.300
6 HW	6.690	+0.018	2.750	2.500	6.380	2.610

Dimensions (millimeters)

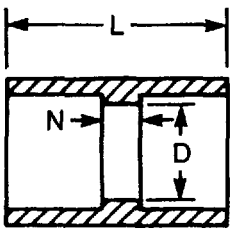
Nominal Size & Type	A		C	C_1	D	P
	Min.	Tol.	Min.	Min.	Min.	Min.
2 HW	60.96	+.254	41.28	50.80	55.88	33.02
3 HW	89.66	+.305	47.63	53.98	84.07	33.02
4 SW	115.19	+.356	58.17	57.15	109.73	33.02
4 HW	116.21	+.356	60.33	57.15	109.73	49.53
5 SW	142.62	+.406	58.17	63.50	136.65	33.02
5 HW	144.65	+.406	63.50	63.50	136.65	66.29
6 SW	167.89	+.457	58.17	63.50	162.05	33.02
6 HW	169.93	+.457	69.85	63.50	162.05	66.29

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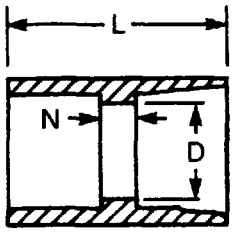
Table 2-3A
COUPLINGS



TAPER X TAPER



SOCKET X SOCKET

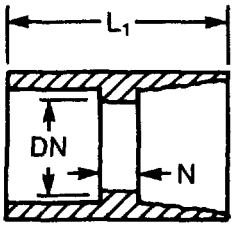


SOCKET X FEMALE TAPER

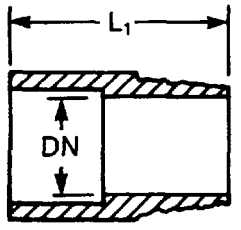
Dimensions

Nominal Size & Type	D Minimum		L Minimum		N Minimum	
	In	mm	In	mm	In	mm
2 HW	2.200	55.88	3.250	82.55	.125	3.18
3 HW	3.310	84.07	3.650	92.71	.125	3.18
4 SW	4.320	109.73	4.580	116.33	.125	3.18
4 HW	4.320	109.73	4.750	120.65	.125	3.18
5 SW	5.380	136.65	4.580	116.33	.125	3.18
5 HW	5.380	136.65	5.000	127.00	.125	3.18
6 SW	6.380	162.05	4.580	116.33	.125	3.18
6 HW	6.380	162.05	5.500	139.70	.125	3.18

Table 2-4A
TERMINAL ADAPTERS



SOCKET X FEMALE-NPT



SOCKET X MALE-NPT

Dimensions

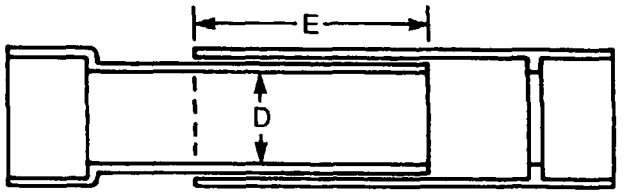
Nominal Size & Type	DN Minimum		L_1 Minimum		N Minimum	
	In	mm	In	mm	In	mm
2 HW	2.000	50.80	3.750	95.25	.125	3.18
3 HW	3.000	76.20	4.000	101.60	.125	3.18
4 SW	4.000	101.60	4.250	107.95	.125	3.18
4 HW	4.000	101.60	4.250	107.95	.125	3.18
5 SW	5.000	127.00	4.750	120.65	.125	3.18
5 HW	5.000	127.00	4.750	120.65	.125	3.18
6 SW	6.000	152.40	4.750	120.65	.125	3.18
6 HW	6.000	152.40	4.750	120.65	.125	3.18

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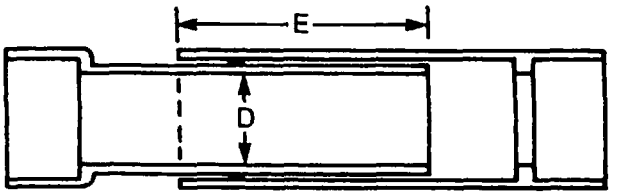
Table 2-5A
EXPANSION JOINTS (TYPICAL)

Note: sleeve and nipple shall be equal in length

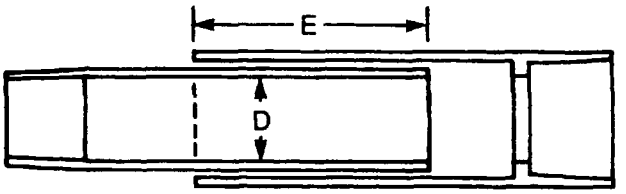
NON-GASKET-DOUBLE SOCKET



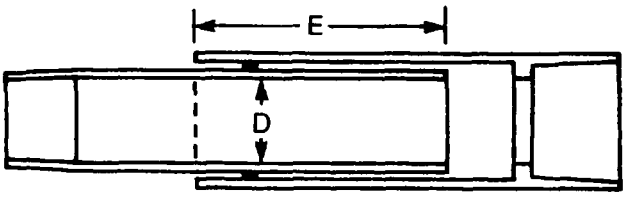
GASKET/O-RING-DOUBLE SOCKET



NON-GASKET-TAPERED JOINT



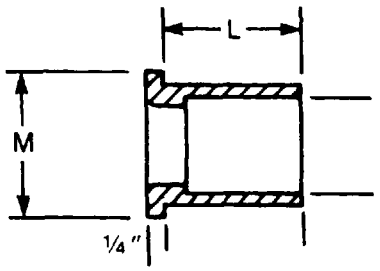
GASKET/O-RING-TAPERED JOINT



Dimensions

Nominal Size & Type	D (Minimum) In	D (Minimum) mm	E Engagement (Minimum) In	E Engagement (Minimum) mm
2 HW	2.200	55.88	3.000	76.2
3 HW	3.310	84.07	3.000	76.2
4 SW	4.320	109.73	3.000	76.2
4 HW	4.320	109.73	3.000	76.2
5 SW	5.380	136.65	3.000	76.2
5 HW	5.380	136.54	3.000	76.2
6 SW	6.380	162.05	3.000	76.2
6 HW	6.380	162.05	3.000	76.2

Table 2-6A
END BELLS-SOCKET TYPE

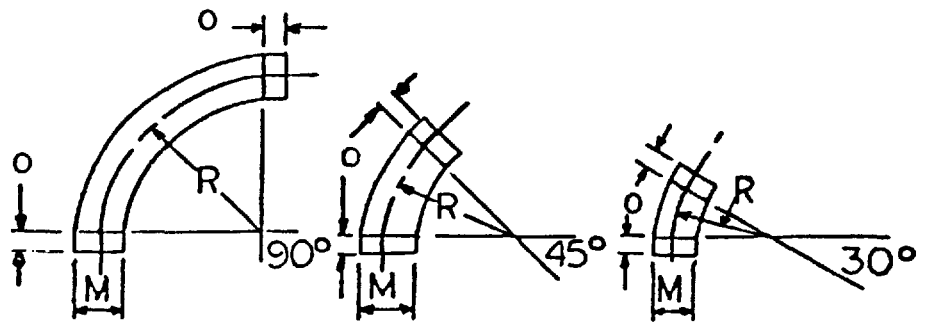


Dimensions

Nominal Size & Type	L (Minimum) In	L (Minimum) mm	M (Minimum) In	M (Minimum) mm
2 SW	2.250	57.15	2.900	73.66
3 HW	2.625	66.68	4.000	101.60
4 SW	2.750	69.85	5.000	127.00
4 HW	2.750	69.85	5.000	127.00
5 SW	3.000	76.20	6.125	155.58
5 HW	3.000	76.20	6.125	155.58
6 SW	3.125	79.38	7.125	177.80
6 HW	3.125	79.38	7.125	177.80

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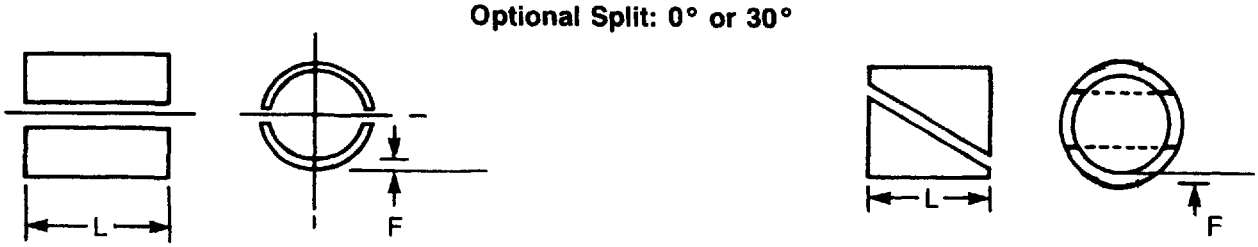
Table 2-7A
ELBOWS—NON-TAPERED
Degrees include: 11¼°, 22½°, 30°, 45°, 90°



Dimensions

Nominal Size & Type	M Nominal O.D.		O Tangent (Minimum)		R Typical Radius	
	In	mm	In	mm	In	mm
2 HW	2.375	60.33	2.000	50.80	24	609.60
3 HW	3.500	88.90	2.125	53.98	30	762.00
4 SW	4.500	114.30	2.250	57.15	42	1066.80
4 HW	4.540	115.32	2.250	57.15	42	1066.80
5 SW	5.563	141.30	2.500	63.50	48	1219.20
. . .	. . .	. . .	. . .	. . .	60	1524.00
5 HW	5.643	143.33	2.500	63.50	48	1219.20
. . .	. . .	. . .	. . .	. . .	60	1524.00
6 SW	6.545	166.24	2.500	63.50	60	1524.00
6 HW	6.625	168.28	2.500	63.50	60	1524.00

Table 2-8A
SPLIT ANCHOR RINGS
Optional Split: 0° or 30°



Dimensions

Nominal Size & Type	F (Minimum)		L (Minimum)	
	In	mm	In	mm
2 HW	.180	4.57	2	50.80
3 HW	.180	4.57	3	76.20
4 SW	.180	4.57	3	76.20
4 HW	.180	4.57	3	76.20
5 SW	.200	5.08	3	76.20
5 HW	.200	5.08	3	76.20
6 SW	.240	6.10	3	76.20
6 HW	.240	6.10	3	76.20

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PART B

PART B
Dimensions Based on Inside Diameters

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Table 2-1B
CONDUIT DIMENSIONS

Type SW (Standard Wall) Inches

Nominal Size	Outside Diameter		Minimum Inside Diameter	Maximum Out-Of-Roundness (I.D.)*	Nominal Wall Thickness**
	Average	Tolerance			
2	...	...	...	...	...
3	...	...	...	...	...
4	4.140	+0.028 −0.018	4.000	0.100	.070
5	5.140	+0.028 −0.018	5.000	0.100	.070
6	6.140	+0.028 −0.018	6.000	0.100	.070

Type SW (Standard Wall) Millimeters

Nominal Size	Outside Diameter		Minimum Inside Diameter	Maximum Out-Of-Roundness (I.D.)*	Nominal Wall Thickness**
	Average	Tolerance			
2	...	...	...	...	...
3	...	...	...	...	...
4	105.16	+0.710 −0.460	101.60	2.54	1.78
5	130.56	+0.710 −0.460	127.00	2.54	1.78
6	155.96	+0.710 −0.460	152.40	2.54	1.78

Type HW (Heavy Wall) Inches

Nominal Size	Outside Diameter		Minimum Inside Diameter	Maximum Out-Of-Roundness (I.D.)*	Nominal Wall Thickness**
	Average	Tolerance			
2	2.140	+0.028 −0.018	2.000	0.060	.070
3	3.140	+0.028 −0.018	3.000	0.080	.070
4	4.180	+0.028 −0.022	4.000	0.100	.090
5	5.220	+0.034 −0.028	5.000	0.100	.110
6	6.220	+0.034 −0.028	6.000	0.100	.100

Type HW (Heavy Wall) Millimeters

Nominal Size	Outside Diameter		Minimum Inside Diameter	Maximum Out-Of-Roundness (I.D.)*	Nominal Wall Thickness**
	Average	Tolerance			
2	54.36	+0.710 −0.460	50.80	1.52	1.78
3	79.76	+0.710 −0.460	76.20	2.03	1.78
4	106.17	+0.710 −0.560	101.60	2.54	2.29
5	132.59	+0.870 −0.710	127.00	2.54	2.79
6	157.99	+0.870 −0.710	152.40	2.54	2.79

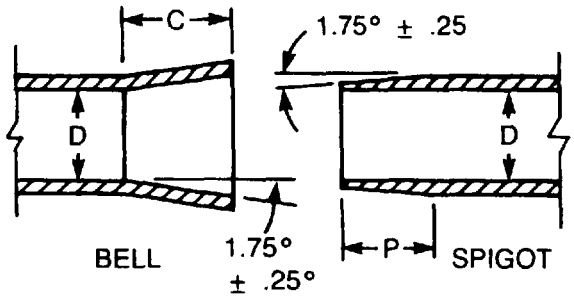
*Out-of-roundness is defined as maximum inside diameter minus minimum inside diameter.

**Wall thickness is that required to meet the performance requirements of this specification.

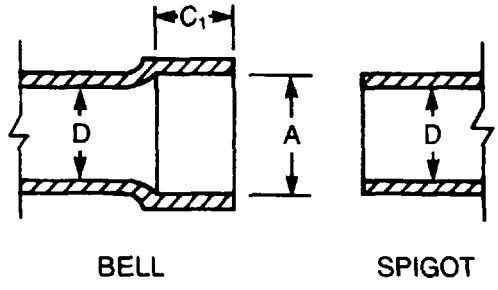
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Table 2-2B
DIMENSIONS FOR CONDUIT JOINTS AND FITTINGS

TAPERED JOINT—SMOOTH OR THREADED



UNTAPERED JOINT—SMOOTH



Dimensions (inches)

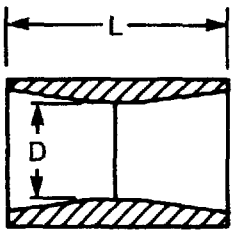
Nominal Size & Type	A		C	C_1	D	P
	Min.	Tol.	Min.	Min.	Min.	Min.
2 HW	2.170	+.010	1.625	2.000	2.000	2.000
3 HW	3.170	+.010	1.825	2.125	3.000	2.250
4 SW	4.170	+.010	2.290	2.250	4.000	2.250
4 HW	4.230	+.015	2.375	2.250	4.000	2.250
5 SW	5.170	+.010	2.290	2.500	5.000	3.000
5 HW	5.230	+.015	2.500	2.500	5.000	3.000
6 SW	6.170	+.010	2.290	2.500	6.000	3.000
6 HW	6.230	+.015	2.750	2.500	6.000	3.000

Dimensions (millimeters)

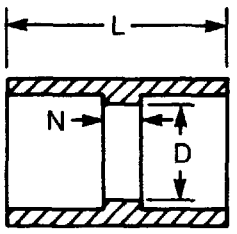
Nominal Size & Type	A		C	C_1	D	P
	Min.	Tol.	Min.	Min.	Min.	Min.
2 HW	55.12	+.25	41.28	50.80	50.80	50.80
3 HW	80.52	+.25	47.63	53.98	76.20	57.15
4 SW	105.92	+.25	58.17	57.15	101.60	57.15
4 HW	107.44	+.38	60.33	57.15	101.60	57.15
5 SW	131.32	+.25	58.17	63.50	127.00	76.20
5 HW	132.84	+.38	63.50	63.50	127.00	76.20
6 SW	156.72	+.25	58.17	63.50	152.40	76.20
6 HW	158.24	+.38	69.85	63.50	152.40	76.20

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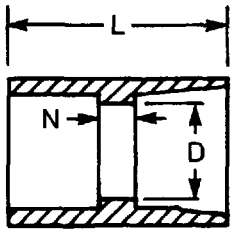
Table 2-3B
COUPLINGS



TAPER X TAPER



SOCKET X SOCKET

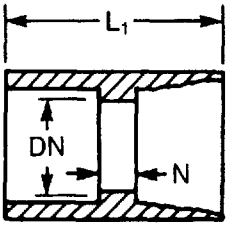


SOCKET X FEMALE TAPER

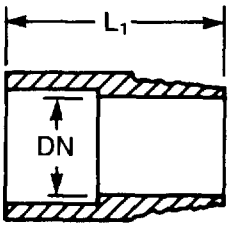
Dimensions

Nominal Size & Type	D Minimum		L Minimum		N Minimum	
	In	mm	In	mm	In	mm
2 HW	2.000	50.80	4.500	114.30	.125	3.18
3 HW	3.000	76.20	5.500	139.70	.125	3.18
4 SW	4.000	101.60	5.500	139.70	.125	3.18
4 HW	4.000	101.60	5.500	139.70	.125	3.18
5 SW	5.000	127.00	6.500	165.10	.125	3.18
5 HW	5.000	127.00	6.500	165.10	.125	3.18
6 SW	6.000	152.40	6.500	165.10	.125	3.18
6 HW	6.000	152.40	6.500	165.10	.125	3.18

Table 2-4B
TERMINAL ADAPTERS



SOCKET X FEMALE-NPT



SOCKET X MALE-NPT

Dimensions

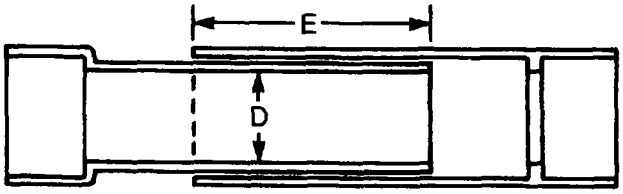
Nominal Size & Type	DN Minimum		L_1 Minimum		N Minimum	
	In	Mil.	In	Mil.	In	Mil.
2 HW	2.000	50.80	7.875	200.03	.125	3.18
3 HW	3.000	76.20	7.875	200.03	.125	3.18
4 SW	4.000	101.60	7.875	200.03	.125	3.18
4 HW	4.000	101.60	7.875	200.03	.125	3.18
5 SW	5.000	127.00	7.875	200.03	.125	3.18
5 HW	5.000	127.00	7.875	200.03	.125	3.18
6 SW	6.000	152.40	7.875	200.03	.125	3.18
6 HW	6.000	152.40	7.875	200.03	.125	3.18

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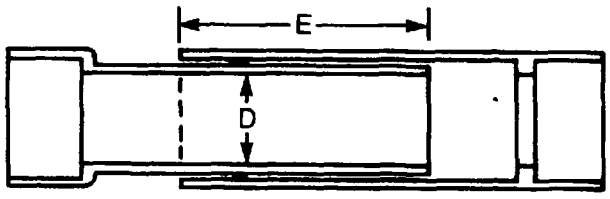
Table 2-5B
EXPANSION JOINTS (TYPICAL)

Note: sleeve and nipple should be equal in length

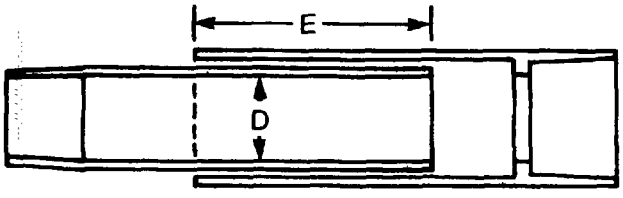
NON-GASKET-DOUBLE SOCKET



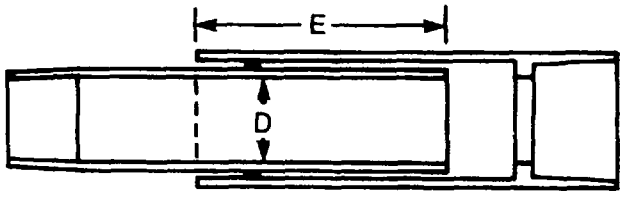
GASKET/O-RING-DOUBLE SOCKET



NON-GASKET-TAPERED JOINT



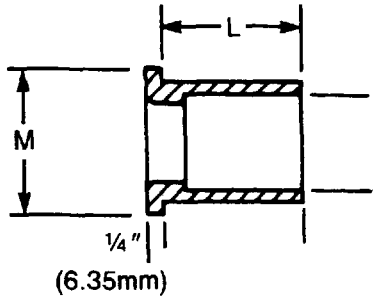
GASKET/O-RING-TAPERED JOINT



Dimensions

Nominal Size & Type	D (Minimum) In	D (Minimum) mm	E Engagement (Minimum) In	E Engagement (Minimum) mm
2 HW	2.000	50.80	3.000	76.2
3 HW	3.000	76.20	3.000	76.2
4 SW	4.000	101.60	3.000	76.2
4 HW	4.000	101.60	3.000	76.2
5 SW	5.000	127.00	3.000	76.2
5 HW	5.000	127.00	3.000	76.2
6 SW	6.000	152.40	3.000	76.2
6 HW	6.000	152.40	3.000	76.2

Table 2-6B
END BELLS-SOCKET TYPE

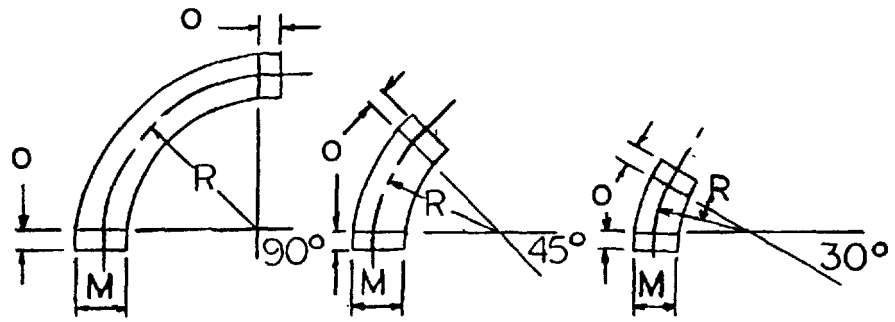


Dimensions

Nominal Size & Type	L (Minimum) In	L (Minimum) mm	M (Minimum) In	M (Minimum) mm
2 SW	1.550	39.37	3.000	76.20
3 HW	1.550	39.37	4.000	101.60
4 SW	2.000	50.80	5.000	127.00
4 HW	2.000	50.80	5.000	127.00
5 SW	2.000	50.80	6.000	152.40
5 HW	2.000	50.80	6.000	152.40
6 SW	2.250	57.15	7.000	177.80
6 HW	2.250	57.15	7.000	177.80

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Table 2-7B
ELBOWS—NON-TAPERED
Degrees include: 11¼°,22½°, 30°, 45°, 90°



Dimensions

Nominal Size & Type	M Nominal O.D.		P Tangent (Minimum)		R Typical Radius	
	In	mm	In	mm	In	mm
2 HW	2.140	54.36	5.000	127.000	36	914.40
3 HW	3.140	79.76	5.000	127.000	36	914.40
4 SW	4.180	105.16	5.000	127.000	36	914.40
4 HW	4.180	106.17	5.000	127.000	36	914.40
5 SW	5.140	130.56	5.000	127.000	48	1219.20
5 HW	5.220	132.59	5.000	127.000	48	1219.20
6 SW	6.140	155.96	5.000	127.000	60	1524.00
6 HW	6.220	157.99	5.000	127.000	60	1524.00

Table 2-8B
SPLIT ANCHOR RINGS
Optional Split: 0° or 30°



Dimensions

Nominal Size & Type	F (Minimum)		L (Nominal)	
	In	mm	In	mm
2 HW	.165	4.19	2.000	50.80
3 HW	.165	4.19	3.000	76.20
4 SW	.165	4.19	3.000	76.20
4 HW	.165	4.19	3.000	76.20
5 SW	.260	6.60	3.000	76.20
5 HW	.260	6.60	3.000	76.20
6 SW	.260	6.60	3.000	76.20
6 HW	.260	6.60	3.000	76.20

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Section 3
PERFORMANCE REQUIREMENTS

3.1 WORKMANSHIP

The conduit shall be free from all defects including delaminations, bubbles, pinholes, foreign inclusions, and resin-starved areas, which due to their nature, degree, or extent, detrimentally affect the strength and serviceability of the conduit. The conduit shall be as uniform as commercially practicable in color, opacity, density, and other physical properties. The conduit shall be straight and the ends shall be cut at right angles to the axis and any burrs removed.

NEMA Standard 7-12-1984.

3.2 JOINING METHODS

3.2.1 Tapered-Bell and Spigot

Tapered joints shall be for use with adhesives meeting the requirements of 2.4, shall be manufactured to the dimensions shown in Table 2-2A or Table 2-2B, and shall meet the requirements of 3.8.

3.2.2 Mechancial Joints

Threaded and gasket-type joints shall meet the dimensional requirements of Table 2-2A or Table 2-2B and the performance requirements of Section 3.8.

3.2.3 Saw-Cut Joining Systems

Saw-cut systems are for use with adhesives (2.4) and manufactured to the dimensions in Table 2-3A or Table 2-3B and shall meet the requirements of 3.8.

NEMA Standard 11-20-1986.

3.3 HEAT DISTORTION (REFEREE TEST)

3.3.1 The minimum heat distortion temperature shall be 215°F (102°C) when tested at 264 psi (1,820 KPa) in accordance with ASTM D 648.

NEMA Standard 7-12-1984.

3.4 TENSILE STRENGTH

3.4.1 The minimum longitudinal tensile strength of the conduit shall not be less than 9,000 psi (62,052 KPa) when tested at 73 °F (23 °C) in accordance with ASTM D 2105.

NEMA Standard 7-12-1984.

3.5 FIRE RESISTANCE (FLAMMABILITY-REFEREE TEST)

3.5.1 Vertical specimens of the finished conduit shall not flame for longer than 5 seconds following any of three 60-second applications of flame, the period between applications being 30 seconds. The conduit shall not be capable of igniting combustible materials in its vicinity during, between, or after the three applications of the test flame, when tested in accordance with section 12 of UL 651.

NEMA Standard 7-12-1984.

3.6 STIFFNESS (F/ΔY)

3.6.1 The minimum conduit stiffness at five percent deflection for all sizes of conduit shall not be less than the values given in Table 3-1 when tested in accordance with 4.2.

NEMA Standard 7-12-1984.

Table 3-1
MINIMUM STIFFNESS (F/ΔY)

Nominal Sizes Inches	Type SW		Type HW	
	lbf/(in. · in.)	kPa	lbf/(in. · in.)	kPa
2	. . .	. . .	180	1241.1
3	. . .	. . .	60	413.7
4	40	275.8	90	620.5
5	22	151.7	80	551.6
6	13	89.6	50	344.7

3.7 IMPACT RESISTANCE

The minimum impact resistance values for the conduit shall be as shown in Table 3-2 when tested in accordance with 4.3.

NEMA Standard 7-12-1984.

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Table 3-2
MINIMUM IMPACT RESISTANCE

Foot Pounds

Nominal Size	at 73.4°F		at 32°F	
	Type SW	Type HW	Type SW	Type HW
2	...	30	...	30
3	...	50	...	50
4	50	80	50	80
5	70	105	70	105
6	100	140	100	140

Joules

Nominal Size	at 23°C		at 0°C	
	Type SW	Type HW	Type SW	Type HW
2	...	40.68	...	40.68
3	...	67.80	...	67.80
4	67.80	108.48	67.80	108.48
5	94.92	142.38	94.92	142.38
6	135.60	189.84	135.60	189.84

3.8 JOINT PULLOUT—REFEREE TEST ONLY

A 12-inch length shall be cut from both the belled end and spigot end of a length of conduit. The two parts shall be assembled in accordance with the manufacturer's instructions. The assembly shall be tested in accordance with ASTM D 2105 and shall meet the requirements of Table 3-3.

NEMA Standard 7-12-1984.

Table 3-3
JOINT PULLOUT RESISTANCE

Nominal Size	Minimum Force		
	Adhesive Joints	Mechanical Joints*	
		Pounds	Joules/cm
All	Must equal or exceed the conduit tensile strength listed by the manufacturer	1000	44.48

*without adhesive

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Section 4
TEST METHODS

4.1 CONDITIONING TEST SPECIMENS AND TEST CONDITIONS

4.1.1 Referee Tests

When conditioning is required, the test specimen shall be conditioned in accordance with Procedure A in ASTM D 618 at 73.4° ± 3.6°F (23° ± 2°C) and 50 ± 5 percent relative humidity for not less than 40 hours prior to test. The 32°F (0°C) drop weight impact specimens shall be conditioned for at least 4 hours in liquid maintained at 32° to 35°F (0° to 1.6°C) unless otherwise specified.

Tests shall be conducted at 73.4° ± 3.6°F (23° ± 2°C) and 50 ± 5 percent relative humidity unless otherwise specified.

4.1.2 Quality Control

Specimens shall be conditioned for 3 hours in air, or 1 hour in liquid, at 73.4° ± 3.6°F (23° ± 2°C). The 32°F (0°C) drop impact samples shall be conditioned for not less than one hour in liquid maintained at 32° to 35°F (0° to 1.6°C).

Specimens shall be tested at 73.4 ± 3.6°F (23° ± 2°C) with no regard for relative humidity. The low temperature impact test equipment shall be at 73.4° ± 3.6°F (23° ± 2°C) with no requirement for relative humidity.

NEMA Standard 7-12-1984.

4.2 CONDUIT STIFFNESS TEST

The conduit stiffness (F/ΔY) shall be determined at 5 percent inside diameter deflection in accordance with ASTM D 2412. The vertical inside diameter shall be measured before compressing the specimens. Three specimens, each 6 ± ⅛ inches (152.4 ± 3.2 mm) long, shall be cut from the conduit. The specimens shall be compressed at the rate of ½ inch (12.7 mm) per minute and the load recorded at the vertical deflection equivalent to 5 percent of the original inside diameter of the specimen. The conduit stiffness at the 5 percent vertical deflection shall be determined as follows:

Conduit Stiffness (F/ΔY): Pounds · Force/(in. · in.) · (kPa)

Where:

F = load in pounds per inch of length recorded at 5 percent vertical deflection, of inside diameter of sample, in inches.

ΔY = vertical deflection of inside diameter in inches.

NEMA Standard 7-12-1984.

4.3 IMPACT RESISTANCE TEST

Five specimens, each 6 ± ⅛ (152.4 ± 1.6 mm) inches long, shall be tested using the apparatus described in ASTM D 2444, using a 12 pound (5.4 kg) Tup B and flat plate holder. If one specimen fails, another five specimens shall be tested. If nine out of ten specimens pass the requirements of 3.7, the conduit shall be considered to have met the requirements of this standard. No more than 15 seconds shall elapse from the time of removal of the specimen from the conditioning medium until completion of the 32°F (0°C) test.

Failure is defined as a sharp break that produces a sharp protrusion into the inside of the conduit.

NEMA Standard 7-12-1984.

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Section 5
MARKING

Each piece of conduit shall be clearly and durably marked every 10 feet with the following information in such a manner that it remains legible under normal shipping, handling, and installation procedures:

Nominal size (Specify A or B)
Type: SW or HW
Manufacturer's name or trademark
Material Designation: Resin designation (i.e., epoxy, polyester, and so forth)
The specification number (TC 14A or TC 14B).
Any additional information deemed necessary by the manufacturer.
All fittings shall be marked with the above information.
Bends shall, in addition, be marked to show the degree and radius of the curvature.

NEMA Standard 7-12-1984.

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Section 6
REQUIREMENTS FOR REPORTING ENGINEERING DATA

6.1 RECOMMENDED MAXIMUM BEAM DEFLECTION

Shall not exceed ⅝ inch (15.9 mm).

Authorized Engineering Information 9-12-1984.

6.2 BEAM DEFLECTION/SUPPORT SPACING CALCULATION METHOD

Method: Fixed and uniformly loaded beam; 5 or more interior continuous spans loaded and equal in length.

Calculations:

Maximum Support Spacing

$$L = \sqrt[4]{\frac{240\ EI}{W}}$$

Where:

L = Distance from support to adjacent support measured in inches

W = Unit load (pounds/linear inch of conduit and cable)

E = Flexural modulus in units of pounds force per square inch at 73.4°F (23°C), or the maximum ambient temperature anticipated.

I = Area moment of inertia about the centroidal axis of the conduit cross-section. Measured in units of inch to the fourth power.

Deflection = 0.625 inch (15.9 mm). Recommended maximum midspan conduit deflection.

240 = The deflection (0.625 in.) × the constant (384).

Note: Should conduit deflections, other than ⅝ inch (15.9 mm) be desired, the above expression may be used to calculate the distance between midspan support. Merely substitute the desired deflection in inches for 0.625 inch in the expression. To determine the spacing for the last two spans at the ends of the bridge, multiply the midspan spacing by 0.79.

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6.3 BENDING RADIUS CALCULATION

Bending radius may be calculated with a maximum design bending stress of 5000 psi using the following equations:

6.03.1 U. S. Units

$$R = \frac{(E)\ (OD)}{24\varphi}$$

Where:

R = minimum radius, ft.

E = bending modules, psi

OD = in inches

φ = design stress

6.03.2 Metric Units

$$R = \frac{(E)\ (OD)}{2000\varphi}$$

Where:

R = minimum radius, M

E = bending modules, kPa

OD = in millimeters

φ = design stress

Authorized Engineering Information 7-12-1984.

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STD.NEMA TC 14-ENGL 1984 6470247 0524460 494



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