



TECHNICAL SERVICES DEPARTMENT

BULLETIN

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Application of Flexible Conduit for Structural Joints Intended for Expansion, Contraction, or Deflection

The purpose of this bulletin is to provide guidance, pertaining to 300.4(H) Structural Joints of the NEC®, in determining the type, length, and bend radius of Flexible Conduit products used for structural joints intended for expansion, contraction, or deflection, used in buildings, bridges, parking garages or other structures.

The type of Flexible Conduit selected is based on the location of the structural joint and the environmental and physical exposure. Three choices of Flexible Conduit *types* are available; Flexible Metal Conduit (FMC) that is anunjacketed helically wound, formed, interlocking metal strip conduit, Liquidtight Flexible Metal Conduit (LFMC) that has an outer nonmetallic liquidtight jacket over an inner flexible metal core, and Liquidtight Flexible Nonmetallic Conduit (LFNC) that is completely nonmetallic with or without an outer nonmetallic liquidtight jacket over a flexible nonmetallic core. Information for understanding the details on how these products are constructed and marked, as well as information on special or optional ratings are provided by UL Product Spec www.UL.com/productspec which replaces the document previously referred to as the White Book.

The minimum radius of bend for Flexible Conduit is prescribed by the NEC®, which specifies that the minimum centerline bend radius (“R” as shown in Figure 1) not be less than that listed in Table 2 of Chapter 9 of the NEC® under the “Other Bends” column.

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The following calculation is applied for determining the required overall length of conduit installed in a traveling vertical loop with offset. If there is no travel or offset, "T" and "F" in Figure 1 are equal to zero, respectively. It should be noted that these lengths do not include the length of fittings, as different types of fittings vary in length.

$$L = (8 \times TS) + (1.57 \times A) + \frac{T}{2} + F$$

Where:

L = Overall length of conduit

TS = Trade size diameter

A = Horizontal distance between fittings*

T = Travel distance

F = Offset

Suggested straight length for each end = 4 x Trade Size diameter

* Must be greater or equal to 2x the minimum bending radius from NEC® Chapter 9, Table 2

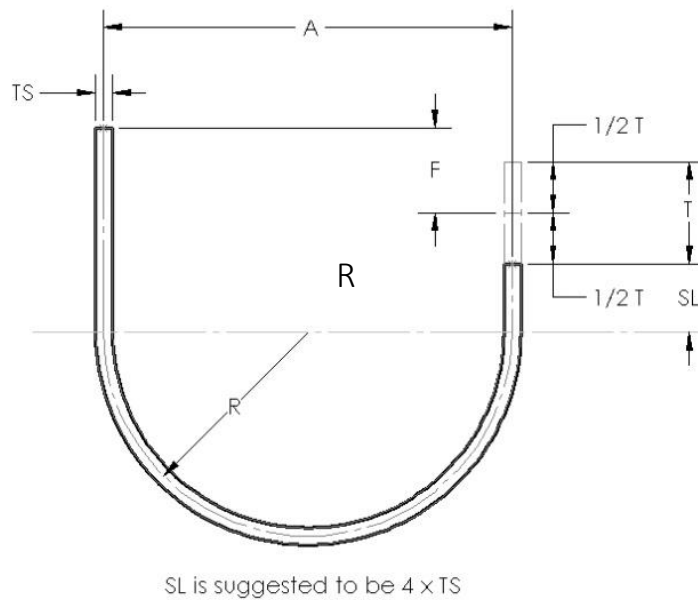


Figure 1
DETERMINATION OF OVERALL LENGTH OF CONDUIT INSTALLED IN A TRAVELING VERTICAL LOOP WITH OFFSET

Overall lengths for installations of FMC, LFMC and LFNC having lateral offset “O”, as shown in Figure 2 are presented in Tables 1 through 10.

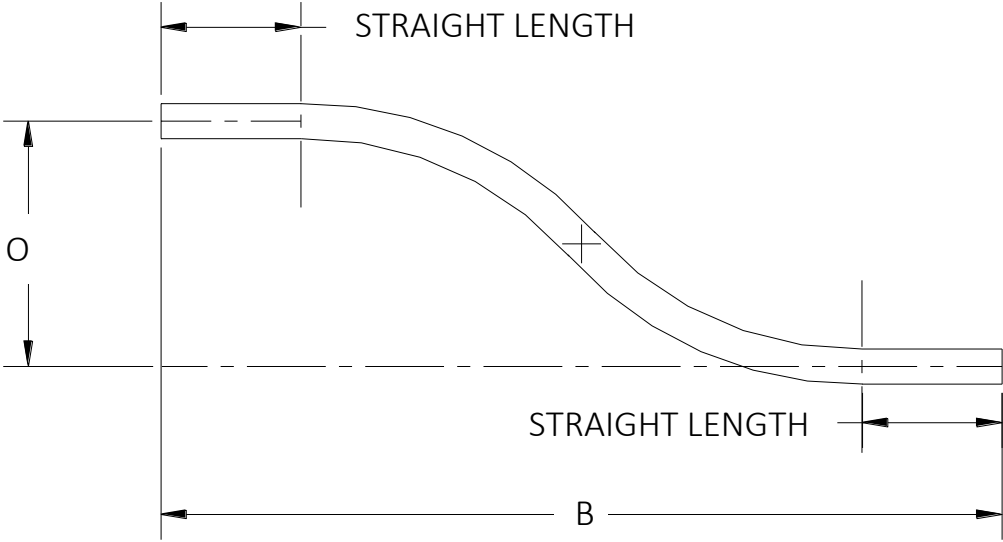


Figure 2
STRAIGHT LENGTH

With reference to Figures 1 and 2, the NEC® should be consulted for installation requirements for FMC and LFMC including maximum number of bends and support requirements.

Table 1
OVERALL CONDUIT LENGTH FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 1/2

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	1.0	1.5	2	2.5	3.0	4.0	5.0	6.0	8.0	10.0
5	5.6	—	—	—	—	—	—	—	—	—
6	6.3	6.7	—	—	—	—	—	—	—	—
7	7.2	7.5	7.8	8.2	—	—	—	—	—	—
8	8.2	8.4	8.6	9.0	9.4	—	—	—	—	—
9	9.1	9.3	9.5	9.8	10.1	10.9	—	—	—	—
10	10.1	10.2	10.4	10.7	11.0	11.6	12.5	—	—	—
11	11.1	11.2	11.4	11.6	11.8	12.4	13.2	14.0	—	—
12	12.1	12.2	12.3	12.5	12.7	13.3	13.9	14.7	16.6	—
13	13.1	13.2	13.3	13.5	13.6	14.1	14.7	15.5	17.2	—
14	14.1	14.1	14.3	14.4	14.6	15.0	15.6	16.2	17.8	19.7
15	15.1	15.1	15.2	15.4	15.5	15.9	16.5	17.1	18.5	20.3
20	20.0	20.1	20.2	20.3	20.4	20.7	21.0	21.5	22.5	23.9
25	25.0	25.1	25.1	25.2	25.3	25.5	25.8	26.1	27.0	28.0
30	30.0	30.0	30.1	30.2	30.2	30.4	30.6	30.9	31.6	32.5

Table 2
OVERALL CONDUIT LENGTH FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 3/4

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	1.0	1.5	2	2.5	3.0	4.0	5.0	6.0	8.0	10.0
7	7.6	—	—	—	—	—	—	—	—	—
8	8.3	8.7	—	—	—	—	—	—	—	—
9	9.2	9.5	9.8	—	—	—	—	—	—	—
10	10.2	10.4	10.6	11.0	—	—	—	—	—	—
11	11.1	11.3	11.5	11.8	—	—	—	—	—	—
12	12.1	12.2	12.4	12.7	13.0	—	—	—	—	—
13	13.1	13.2	13.4	13.6	13.8	14.4	—	—	—	—
14	14.1	14.2	14.3	14.5	14.7	15.3	—	—	—	—
15	15.1	15.2	15.3	15.5	15.6	16.1	16.7	—	—	—
20	20.0	20.1	20.2	20.3	20.4	20.7	21.2	21.7	22.9	24.4
25	25.0	25.1	25.1	25.2	25.3	25.6	25.9	26.2	27.2	28.3
30	30.0	30.1	30.1	30.2	30.2	30.4	30.7	31.0	31.7	32.7

Table 3
OVERALL CONDUIT LENGTH FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 1

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	1.0	1.5	2	2.5	3.0	4.0	5.0	6.0	8.0	10.0
9	9.6	—	—	—	—	—	—	—	—	—
10	10.3	10.7	—	—	—	—	—	—	—	—
11	11.2	11.5	11.8	—	—	—	—	—	—	—
12	12.2	12.4	12.6	13.0	—	—	—	—	—	—
13	13.1	13.3	13.5	13.8	14.1	—	—	—	—	—
14	14.1	14.2	14.4	14.7	15.0	15.6	—	—	—	—
15	15.1	15.2	15.4	15.6	15.8	16.4	17.2	—	—	—
20	20.1	20.1	20.2	20.3	20.5	20.9	21.3	21.9	23.3	24.9
25	25.0	25.1	25.2	25.2	25.3	25.6	26.0	26.4	27.4	28.7
30	30.0	30.1	30.1	30.2	30.3	30.5	30.7	31.1	31.9	32.9

Table 4
OVERALL CONDUIT LENGTH FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 1-1/4

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	1.0	1.5	2	2.5	3.0	4.0	5.0	6.0	8.0	10.0
11	11.6	—	—	—	—	—	—	—	—	—
12	12.3	12.7	—	—	—	—	—	—	—	—
13	13.2	13.5	13.8	—	—	—	—	—	—	—
14	14.2	14.4	14.6	—	—	—	—	—	—	—
15	15.1	15.3	15.5	15.8	—	—	—	—	—	—
16	16.1	16.2	16.4	16.7	—	—	—	—	—	—
17	17.1	17.2	17.4	17.6	17.8	—	—	—	—	—
18	18.1	18.2	18.3	18.5	18.7	19.3	—	—	—	—
19	19.1	19.2	19.3	19.5	19.6	20.1	20.7	—	—	—
20	20.1	20.1	20.3	20.4	20.6	21.0	21.6	22.2	—	—
25	25.0	25.1	25.2	25.3	25.4	25.7	26.1	26.5	27.7	29.1
30	30.0	30.1	30.1	30.2	30.3	30.5	30.8	31.2	32.1	33.2

Table 5
OVERALL LENGTH OF CONDUIT FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 1-1/2

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	1.0	1.5	2	2.5	3.0	4.0	5.0	6.0	8.0	10.0
13	13.6	—	—	—	—	—	—	—	—	—
14	14.3	—	—	—	—	—	—	—	—	—
15	15.2	15.5	—	—	—	—	—	—	—	—
16	16.2	16.4	16.6	—	—	—	—	—	—	—
17	17.1	17.3	17.5	17.8	—	—	—	—	—	—
18	18.1	18.2	18.4	18.7	19.0	—	—	—	—	—
19	19.1	19.2	19.4	19.6	19.8	—	—	—	—	—
20	20.1	20.2	20.3	20.5	20.7	21.3	—	—	—	—
25	25.0	25.1	25.2	25.3	25.5	25.8	26.2	26.8	—	—
30	30.0	30.1	30.1	30.2	30.3	30.6	30.9	31.3	32.3	33.5

Table 6
OVERALL LENGTH OF CONDUIT FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 2

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	1.0	1.5	2	2.5	3.0	4.0	5.0	6.0	8.0	10.0
17	17.6	—	—	—	—	—	—	—	—	—
18	18.3	18.7	—	—	—	—	—	—	—	—
19	19.2	19.5	19.8	20.2	—	—	—	—	—	—
20	20.2	20.4	20.6	21.0	21.4	—	—	—	—	—
22	22.1	22.2	22.4	22.7	23.0	23.6	—	—	—	—
24	24.1	24.2	24.3	24.5	24.7	25.3	25.9	—	—	—
26	26.1	26.1	26.3	26.4	26.6	27.0	27.6	28.2	—	—
28	28.1	28.1	28.2	28.3	28.5	28.9	29.3	29.9	31.3	—
30	30.0	30.1	30.2	30.3	30.4	30.7	31.2	31.7	32.9	34.4

Table 7
OVERALL LENGTH OF CONDUIT FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 2-1/2

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
22	22.3	23.1	—	—	—	—	—	—	—	—
24	24.2	24.6	25.4	26.3	—	—	—	—	—	—
26	26.1	26.4	27	27.6	28.5	29.4	—	—	—	—
28	28.1	28.3	28.7	29.3	29.9	30.7	32.6	—	—	—
30	30.1	30.3	30.6	31	31.6	32.2	33.8	35.7	—	—
32	32.1	32.2	32.5	32.9	33.3	33.9	35.3	36.9	—	—
34	34.0	34.2	34.4	34.7	35.2	35.7	36.9	38.4	40.1	—
36	36.0	36.2	36.4	36.7	37.0	37.5	38.5	39.9	41.4	43.2
38	38.0	38.1	38.3	38.6	38.9	39.3	40.3	41.5	42.9	44.5
40	40.0	40.1	40.3	40.5	40.8	41.2	42.1	43.2	44.5	46.0

Table 8
OVERALL LENGTH OF CONDUIT FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 3

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
26	26.3	27.1	—	—	—	—	—	—	—	—
28	28.2	28.6	29.4	30.3	—	—	—	—	—	—
30	30.1	30.4	31.0	31.6	32.5	33.4	—	—	—	—
32	32.1	32.3	32.7	33.3	33.9	34.7	36.6	—	—	—
34	34.1	34.3	34.6	35.0	35.6	36.2	37.8	39.7	—	—
36	36.1	36.2	36.5	36.9	37.3	37.9	39.3	40.9	—	—
38	38.0	38.2	38.4	38.7	39.2	39.7	40.9	42.4	44.1	—
40	40.0	40.2	40.4	40.7	41.0	41.5	42.5	43.9	45.4	47.2
42	42.0	42.1	42.3	42.6	42.9	43.3	44.3	45.5	46.9	48.5

Table 9
OVERALL LENGTH OF CONDUIT FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 3-1/2

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
30	31.1	—	—	—	—	—	—	—	—	—
32	32.6	34.3	—	—	—	—	—	—	—	—
34	34.4	35.6	37.4	—	—	—	—	—	—	—
36	36.3	37.3	38.7	40.6	—	—	—	—	—	—
38	38.3	39.0	40.2	41.8	43.7	—	—	—	—	—
40	40.2	40.9	41.9	43.3	44.9	—	—	—	—	—
42	42.2	42.7	43.7	44.9	46.4	48.1	—	—	—	—
44	44.2	44.7	45.5	46.5	47.9	49.4	51.2	—	—	—
46	46.1	46.6	47.3	48.3	49.5	50.9	52.5	54.3	—	—
48	48.1	48.5	49.2	50.1	51.2	52.5	54.0	55.7	57.5	—
50	50.1	50.5	51.1	51.9	52.9	54.1	55.5	57.1	58.8	60.6

Table 10
OVERALL LENGTH OF CONDUIT FOR GIVEN OFFSET AND LATERAL DISTANCE
TRADE SIZE 4

Lateral Distance "B" (inches)	"O" Offset Distance (inches)									
	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
34	35.1	—	—	—	—	—	—	—	—	—
36	36.6	38.3	—	—	—	—	—	—	—	—
38	38.4	39.6	41.4	—	—	—	—	—	—	—
40	40.3	41.3	42.7	44.6	—	—	—	—	—	—
42	42.3	43.0	44.2	45.8	47.7	—	—	—	—	—
44	44.2	44.9	45.9	47.3	48.9	—	—	—	—	—
46	46.2	46.7	47.7	48.9	50.4	52.1	—	—	—	—
48	48.2	48.7	49.5	50.5	51.9	53.4	55.2	—	—	—
50	50.1	50.6	51.3	52.3	53.5	54.9	56.5	58.3	—	—
52	52.1	52.5	53.2	54.1	55.2	56.5	58.0	59.7	61.5	—
54	54.1	54.5	55.1	55.9	56.9	58.1	59.5	61.1	62.8	64.6

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