SUBMITTAL DATA

FOR APPROVAL

C & D ELECTRIC

BENT GRASS

Carlon Schedule 80 PVC Rigid Nonmetallic Conduit (RNC)

(Extra Heavy Wall EPC-80)

ETL Listed to UL 651 in compliance to the NEC

UL LISTED E35297

RUS Accepted

Listed for use in aboveground and belowground applications including areas subject to physical damage.

- Sunlight resistant
- Rated for use with 90°C conductors
- Superior weathering characteristics
- Identified for use in areas subject to physical damage in accordance to 352.12(C)

With Integral Bell*

Schedule 80 Extra Heavy Wall

Part No. 10'	Part No. 20'	Trade Size	Std. Crate Qty. 10'	Std. Crate Qty. 20'	Wt. Per 100'	Dimensions O.D.	Dimensions I.D.	Wall
49405-010	49405-020	1/2"	6000'	12000'	21	.840	.546	.147
49407-010	49407-020	3/4"	4400'	8000'	30	1.050	.742	.154
49408-010	49408-020	1"	3600'	7200'	44	1.315	.957	.179
49409-010	49409-020	1 1/4"	3300'	6600'	60	1.660	1.278	.191
49410-010	49410-020	1 1/2"	2250'	3600'	72	1.900	1.500	.200
49411-010	49411-020	2"	1400'	2800'	101	2.375	1.939	.218
49412-010	49412-020	2 1/2"	930'	1880	154	2.875	2.323	.276
49413-010	49413-020	3"	880'	1760'	210	3.500	2.900	.300
49415-010	49415-020	4"	570'	1140'	308	4.500	3.826	.337
49416-010	–	5"	380'	–	428	5.563	4.813	.375
49417-010	49417-020	6"	260'	520'	588	6.625	5.761	.432

Rigid nonmetallic conduit is normally supplied in standard 10' lengths, with one belled end per length. For specific requirements, it may be produced in lengths shorter or longer than 10', with or without belled ends.

Use RNC Fittings with Schedule 40 and Schedule 80 Conduit.

Notes: 1. Special fittings and conduit sizes will be quoted on request.
2. DON'T FORGET TO ORDER CEMENT.
3. Carlon reserves the right to ship to the nearest unitized quantity.

Support of Carlon Rigid Nonmetallic Conduit in Aboveground Installations

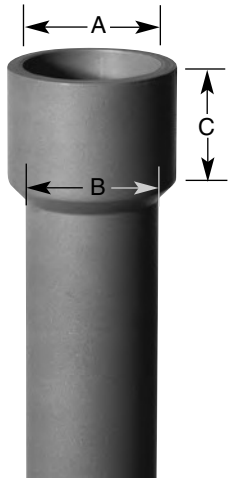
Table 352.30(B) NEC shows the support requirements for Schedule 40 and Schedule 80 rigid PVC nonmetallic conduit.

Plastic conduit should always be installed away from steam lines, etc. Support straps should allow for lineal movement caused by expansion and contraction.

Maximum ambient temperature is 122°F (50°C).

Table 352.30(B), NEC

Trade Size	Maximum Spacing Between Supports (feet)
1/2 - 1	3
1 1/4 - 2	5
2 1/2 - 3	6
3 1/2 - 5	7
6	8

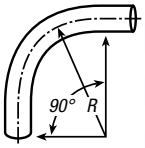
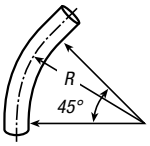
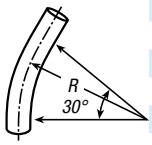
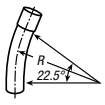
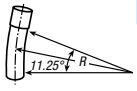


Acceptable Dimensions in Inches of Integral Bell per UL 651

Trade Size	A At Entrance (in.) Maximum	A At Entrance (in.) Minimum	B At Bottom (in.) Maximum	B At Bottom (in.) Minimum	C Nominal Bell Depth (in.)
1/2	0.860	0.844	0.844	0.828	1.375
3/4	1.074	1.054	1.056	1.036	1.500
1	1.340	1.320	1.320	1.300	1.750
1 1/4	1.689	1.665	1.667	1.643	1.875
1 1/2	1.930	1.906	1.906	1.882	2.750
2	2.405	2.381	2.381	2.357	3.250
2 1/2	2.905	2.875	2.883	2.853	3.250
3	3.530	3.500	3.507	3.477	3.875
3 1/2	4.065	3.965	4.007	3.977	3.875
4	4.565	4.465	4.506	4.476	4.625
5	5.643	5.543	5.583	5.523	5.625
6	6.708	6.608	6.644	6.584	6.375

Schedule 80 Elbows

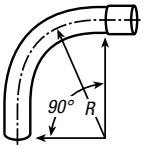
Standard Radius

ITEM	PLAIN END CAT. NO.	BELLED END CAT. NO.	SIZE (IN.)	PLAIN END STD. CTN.	BELLED END STD. CTN.
90° ELBOW	UB9AD	—	½	50	—
	UB9AE	—	¾	25	—
	UB9AF	—	1	25	—
	UB9AG	—	1¼	20	—
	UB9AH	—	1½	25	—
	UB9AJ	—	2	20	—
	UB9AK	—	2½	10	—
	UB9AL	—	3	5	—
	UB9AN	—	4	1	—
	UB9AP	UB9APB	5	1	1
	UB9AR	—	6	1	—
45° ELBOW	UB7AD	—	½	50	—
	UB7AE-UPC	—	¾	25	—
	UB7AF-UPC	—	1	20	—
	UB7AG	—	1¼	20	—
	UB7AH	—	1½	20	—
	UB7AH-CAR	—	1½	5	—
	UB7AJ-UPC	—	2	20	—
	UB7AK	—	2½	20	—
	UB7AL	—	3	1	—
	UB7AN	—	4	1	—
	UB7AP	UB7APB	5	1	1
	UB7AR	—	6	1	—
30° ELBOW	UB6AD	—	½	50	—
	UB6AE	—	¾	25	—
	UB6AF	—	1	25	—
	UB6AG	—	1¼	5	—
	UB6AH	—	1½	25	—
	UB6AJ	—	2	20	—
	UB6AK	—	2½	1	—
	UB6AL	—	3	1	—
	UB6AN	—	4	1	—
	UB6AP	—	5	1	—
	UB6AR	—	6	1	—
22½° ELBOW	UB5AL	—	3	5	—
	UB5AN	—	4	1	—
	UB5AP	UB5APB	5	1	1
11¼° ELBOW	UB3AL	—	3	1	—
	UB3AR	—	6	1	—

For use with non-metallic solvent weld fittings.

Special Radius

UL LISTED E23018

SEGMENT	PLAIN END CAT. NO.	BELLED END CAT. NO.	NOM. DIAM. (IN.)	RADIUS (IN.)	PLAIN END STD. CTN.	BELLED END STD. CTN.
90° ELBOW	UB9CF	—	1	18	1	—
	UB9DF	—	1	24	1	—
	UB9FF	—	1	36	1	—
	UB9HF	—	1	48	1	—
	UB9CG	—	1¼	18	1	—
	UB9DG	—	1¼	24	1	—
	UB9FG	—	1¼	36	1	—
	UB9HG	—	1¼	48	1	—
	UB9CH	—	1½	18	1	—
	UB9DH-UPC	UB9DHB	1½	24	1	1
	UB9FH	—	1½	36	1	—
	UB9HH	—	1½	48	1	—
	UB9CJ	—	2	18	1	—
	UB9DJ-UPC	UB9DJB	2	24	1	1
	UB9FJ	UB9FJB	2	36	1	1
	UB9HJ	—	2	48	1	—
	UB9CK	—	2½	18	1	—
	UB9DK-UPC	UB9DKB	2½	24	1	1
	UB9FK	UB9FKB	2½	36	1	1
	UB9HK	—	2½	48	1	—
	UB9CL	—	3	18	1	—
	UB9DL	UB9DLB	3	24	1	1
	UB9FL	UB9FLB	3	36	1	1
	UB9HL	—	3	48	1	—
	UB9DN	UB9DNB	4	24	1	1
	UB9FN	UB9FNB	4	36	1	1
	UB9HN	UB9HNB	4	48	1	1
	UB9NN	—	4	120	1	—
	UB9FP	—	5	36	1	—
	UB9HP	—	5	48	1	—
	UB9IP	—	5	60	1	—
	UB9FR	—	6	36	1	—
	UB9HR	—	6	48	1	—
	UB9IR	—	6	60	1	—

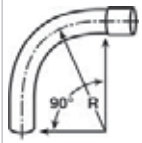
***Note**: Elbows 72" and larger may be shipped in segments. Consult factory for specifics.*

Provide Schedule 80 Elbows

Schedule 40 Elbows Standard Radius

Integral belled end for use with non-metallic solvent weld fittings.

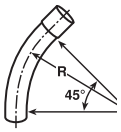
90° Elbow



Item	Belled End Cat. No.	Trade Size (in.)	Std Ctn Qty
	UA9ADCB-CTN	1/2	40
	UA9AECB-CTN	3/4	25
	UA9AFCB-CTN	1	25
	UA9AGCB-UPC	1-1/4	20
	UA9AHCB-UPC	1-1/2	25
	UA9AJCB-UPC	2	20
	UA9AKCB-CTN	2-1/2	10
	UA9ALCB-UPC	3	25
	UA9AMCB	3-1/2	1
	UA9ANCB	4	1
	UA9APCB	5	1
	UA9ARCB	6	1

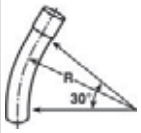
Custom elbows available on request.
Plain end elbows also available.

45° Elbow



Item	Belled End Cat. No.	Trade Size (in.)	Std Ctn Qty
	UA7ADCB-CTN	1/2	25
	UA7AECB-CTN	3/4	20
	UA7AFCB-CTN	1	14
	UA7AGCB	1-1/4	20
	UA7AHCB	1-1/2	20
	UA7AJCB	2	20
	UA7ALCB	3	5
	UA7AMCB	3-1/2	1
	UA7ANCB	4	1
	UA7APCB	5	1
	UA7ARCB	6	1

30° Elbow

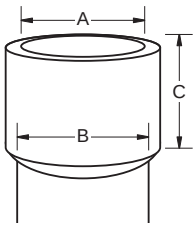


Item	Belled End Cat. No.	Trade Size (in.)	Std Ctn Qty
	UA6ADB	1/2	50
	UA6AEB	3/4	25
	UA6AFB	1	8
	UA6AGB	1-1/4	20
	UA6AHB	1-1/2	1

Flexible Elbows

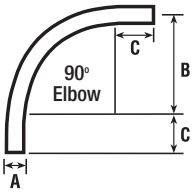
Item	Belled End Cat. No.	Trade Size (in.)	Std Ctn Qty
	UAFAD	1/2	8
	UAFAE	3/4	6
	UAFAF	1	6

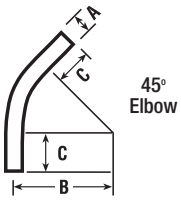
Integral Belled End Dimensions



Trade Size of Conduit (in.)	A		B		C	
	At Entrance		At Bottom		Socket Depth	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
1/2	0.860	0.844	0.844	0.828	1.500	0.652
3/4	1.074	1.054	1.056	1.036	1.500	0.719
1	1.340	1.320	1.320	1.300	1.875	0.875
1-1/4	1.689	1.665	1.667	1.643	2.000	0.938
1-1/2	1.930	1.906	1.906	1.882	2.000	1.062
2	2.405	2.381	2.381	2.357	2.000	1.125
2-1/2	2.905	2.875	2.883	2.853	3.000	1.469
3	3.530	3.500	3.507	3.477	3.125	1.594
3-1/2	4.065	3.965	4.007	3.977	3.250	1.687
4	4.565	4.465	4.506	4.476	3.375	1.750
5	5.653	5.543	5.583	5.523	3.625	1.937
6	6.708	6.608	6.644	6.584	3.750	2.125

Standard Radius Elbow Dimensions





Trade Size (in.)	A	B	C
		Minimum (Radius)	Minimum
1/2	0.840	4	1-1/2
3/4	1.050	4-1/2	1-1/2
1	1.315	5-3/4	1-7/8
1-1/4	1.660	7-1/4	2
1-1/2	1.900	8-1/4	2
2	2.375	9-1/2	2
2-1/2	2.875	10-1/2	3
3	3.500	13	3-1/8
3-1/2	4.000	15	3-1/4
4	4.500	16	3-3/8
5	5.563	24	3-5/8
6	6.625	30	3-3/4

Carlon®

PVC Conduit Repair System

The new, revolutionary, Carlon PVC Conduit Repair System significantly reduces the time and money associated with repairing broken PVC conduits a.k.a. “stub-ups” in concrete slabs.

The system is a line of couplings, adapters, reamers and plugs designed to allow contractors to quickly and easily repair broken PVC conduits without having to chip away and repour concrete, while still maintaining the inside diameter of the conduit. Simply cut off the broken conduit; ream the I.D. of the conduit; and insert a coupling or adapter, it’s that easy.

Features

- C-UL-US Listed
- Non-metallic couplings, adapters and plugs won’t rust or corrode
- Available in sizes 1/2" through 2"

Benefits

- Saves time and money
- Maintains inside diameter of conduit
- Metallic Reamers for extra strength, durability and longer life
- Quickly and easily repair broken PVC conduit

Specifications

Couplings

Cat. No.	Trade Size (in.)	Std Ctn Qty
E910D	1/2	25
E910E	3/4	25
E910F	1	15
E910G	1-1/4	10
E910H	1-1/2	10
E910J	2	10

Male Threaded Adapters

Cat. No.	Trade Size (in.)	Std Ctn Qty
E920D	1/2	25
E920E	3/4	25
E920F	1	15
E920G	1-1/4	10
E920H	1-1/2	10
E920J	2	10

Reamers

Cat. No.	Size (in.)	Std Ctn Qty
E910REAMD	1/2	12
E910REAME	3/4	12
E910REAMF	1	10
E910REAMG	1-1/4	10
E910REAMH	1-1/2	10
E910REAMJ	2	10
E910REAMKIT	All sizes – 1/2, 3/4, 1, 1-1/4, 1-1/2 and 2	5

Schedule 40 Plugs

Cat. No.	Size (in.)	Std Ctn Qty
HL-6X*	1/2	1 bag of 50
HL-10*	3/4	1 bag of 50
HL-13A*	1	1 bag of 50
HL-16*	1-1/4	1 bag of 50
HL-18*	1-1/2	1 bag of 50
HL-21*	2	1 bag of 50

** = Suffixe (R: Red, B: Blue, Y: Yellow)*

c UL us LISTED
E256675

PVC Conduit Repair System Installation

Carlon®

PVC Conduit Repair Fittings

Coupling
E910 Series

Male Threaded
Adapter
E920 Series

Broken conduit on jobsite

Instructions

1. Cut broken conduit off flush.

2. Insert plug to keep conduit clean/dry through balance of rough-in. Once rough-in is complete, remove plug and continue with step 3.

Alternative to Conduit Repairs

Prior to concrete pour, measure and saw cut all conduit stub-ups to the thickness of the concrete pour. Insert plugs. Pour concrete flush to the conduit. When pour is complete, remove plugs and proceed with step 3. This alternative method saves time/money by eliminating the need for transitions or use of metal elbows.

3. With reamer tool and standard 1/2" drill, ream I.D. of conduit. It is recommended to use a variable speed drill. Use slower speed to avoid overheating the conduit.

4. The guide will direct the cutter; the stop will touch when completed.

5. Insert the coupling and cement into place using the cement manufacturer's instructions.

Cementing Instructions

A. Clean socket I.D. and spigot O.D. of dirt and moisture.
B. Apply a uniform coat of cement to spigot end and push onto socket bottom, rotating 1/4 turn.
C. Allow time to set before disturbing. This will depend upon temperature.

Apply a uniform coat of cement.

Insert fitting.

Rotate 1/4 turn.

c UL us
LISTED
E256675

Thomas&Betts

Expansion Fittings*

E945 series expansion fittings are designed to compensate for length changes due to temperature variations in exposed conduit runs.

- Exclusive Molded in Mid-point indicator on the piston.
- Exclusive 2" Expansion Fitting with an 8" travel distance.
- Two-piece molded design with lubricated seals for easier movement for the life of the product.
- Ridges on the fitting for easier installation (Sizes 2" through 6" only).
- Male terminal Adapter End design (1/2" – 2" NPT Threads and 2-1/2" – 6" NPSC Threads).
- Two O-Rings to prevent leakage.
- Can be installed vertically or horizontally.

Coupling end

Male Terminal adapter end

LR31146

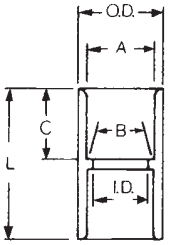
Coupling End Cat. No.	Male Terminal Adapter End Cat. No.	Size (in.)	Std Ctn Qty	Travel Length (in.)
E945D	E945DX	1/2	20	4
E945E	E945EX	3/4	15	4
E945F	E945FX	1	10	4
E945G	E945GX	1-1/4	5	4
E945H	E945HX	1-1/2	5	4
E945J	E945JX	2	15	8
E945K	E945KX	2-1/2	10	8
E945L	E945LX	3	10	8
E945M	E945MX	3-1/2	5	8
E945N	E945NX	4	5	8
E945P	E945PX	5	1	8
E945R	E945RX	6	1	8

* Please refer to page 23 for additional information.

Standard Couplings

All socket fittings should be attached using Carlon solvent cement. Using Carlon fittings with Carlon non-metallic conduit insures system integrity.

Socket type for joining non-metallic conduit.



LR90813

Cat. No.	Size (in.)	Std Ctn Qty	A Typical	B Typical	I.D.	O.D.	C Typical	L Typical
CE940DR-CTN	1/2	75	0.852	0.836	0.728	1-7/64	11-16	1-1/2
CE940ER-CTN	3/4	45	1.064	1.046	0.840	1-5/16	3/4	1-5/8
CE940F-UPC	1	50	1.330	1.310	1.210	1-5/8	15/16	2
E940G	1-1/4	30	1.677	1.655	1.535	1-63/64	1	2-1/8
E940H	1-1/2	25	1.918	1.894	1.755	2-15/64	1-1/8	2-3/8
E940J	2	30	2.393	2.369	2.190	2-47/64	1-3/16	2-1/2
E940K	2-1/2	20	2.890	2.868	2.688	3-5/16	1-33/64	3-3/16
E940L	3	25	3.515	3.492	3.375	3-31/32	1-3/4	3-13/32
E940M	3-1/2	20	4.015	3.992	3.780	4-9/16	1-3/4	3-5/8
E940N	4	15	4.515	4.491	4.265	5-3/32	1-25/32	3-3/4
E940P	5	8	5.593	5.553	5.097	6-1/4	1-5/16	4-1/16
E940R	6	5	6.658	6.614	6.115	7-1/2	2-3/16	4-5/8

Short Expansion Couplings*

(Expands to a maximum of 2 in.)

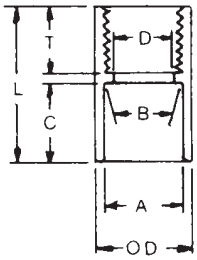
Cat. No.	Size (in.)	Std Ctn Qty
E955D	1/2	40
E955E	3/4	40
E955F	1	25
E955G	1-1/4	15
E955H	1-1/2	10
E955J	2	6

* Please refer to page 23 for additional information.

c UL us LISTED
E23018

Female Adapters

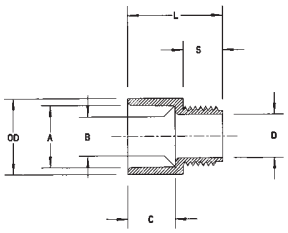
For adapting non-metallic conduits to threaded fittings, metallic systems. Female threads on one end, socket end on other.



Cat. No.	Size (in.)	Std Ctn Qty	A	B	Min. I.D.	Max. O.D.	C	T	L
			Typical				Typical		
E942D	1/2	150	0.852	0.836	0.620	1-7/64	11/16	3/4	1-9/16
E942E	3/4	100	1.064	1.046	0.822	1-5/16	13/16	3/4	1-5/8
E942F	1	50	1.330	1.310	1.046	1-5/8	15/16	7/8	1-15/16
E942G	1-1/4	30	1.677	1.655	1.377	1-63/64	1	7/8	2
E942H	1-1/2	25	1.918	1.894	1.607	2-5/32	1-1/8	7/8	2-7/32
E942J	2	30	2.393	2.369	2.064	2-47/64	1-3/16	1	2-5/16
E942K	2-1/2	20	2.890	2.868	2.450	3-11/32	1-5/8	1-1/8	2-15/16
E942L	3	25	3.515	3.492	3.000	3-31/32	1-3/4	1-1/8	3-1/16
E942M	3-1/2	20	4.015	3.992	3.500	4-1/2	1-7/8	1-1/8	3-1/4
E942N	4	15	4.515	4.491	4.000	5-1/64	1-3/4	1-1/16	3-13/64
E942P	5	8	5.593	5.553	5.047	6-1/4	1-15/16	1-1/16	3-3/16
E942R	6	6	6.658	6.614	6.055	7-1/4	2-1/8	1-1/16	3-3/8

Male Terminal Adapters

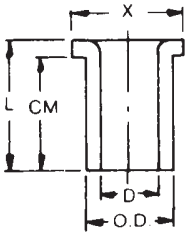
For adapting non-metallic conduits to boxes threaded fittings, metallic systems. Male threads on one end, socket end on other.



Cat. No.	Size (in.)	Std Ctn Qty	A	B	Min. D	Max. O.D.	C	S	L
			Typical				Typical		
E943D	1/2	150	0.852	0.836	0.594	1.042	0.652	0.545	1.310
E943E	3/4	100	1.064	1.046	0.793	1.290	0.809	0.553	1.470
E943F	1	50	1.330	1.310	1.025	1.580	0.965	0.812	1.902
E943G	1-1/4	30	1.677	1.655	1.345	1.973	1.208	0.816	1.986
E943H	1-1/2	25	1.918	1.894	1.574	2.188	1.155	0.802	2.105
E943J	2	30	2.393	2.369	1.998	2.713	1.145	0.825	2.093
E943K	2-1/2	20	2.890	2.868	2.400	3.290	1.490	0.812	2.480
E943L	3	25	3.515	3.492	2.989	3.965	1.643	0.797	2.660
E943M	3-1/2	20	4.015	3.992	3.405	4.515	1.720	0.802	2.740
E943N	4	15	4.515	4.491	3.895	5.065	1.788	0.733	2.830
E943P	5	8	5.593	5.553	4.900	6.104	1.935	0.990	3.200
E943R	6	6	6.658	6.614	5.900	7.288	2.128	0.985	3.410

Box Adapters for Enclosures

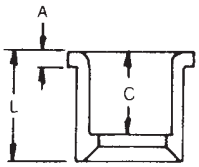
Adapts non-metallic conduit to all electrical enclosures by inserting adapter through knockout and cementing into Carlon couplings.



Cat. No.	Size (in.)	Std Ctn Qty	Min. D	O.D. Typical	Max. X	CM	L
						Typical	
E996D	1/2	100	0.662	0.840	1-7/64	23/32	27/32
E996E	3/4	100	0.824	1.050	1-21/64	25/32	29/32
E996F	1	100	1.049	1.315	1-5/8	61/64	1-3/32
E996G	1-1/4	50	1.380	1.660	1-31/32	1-1/16	1-1/4
E996H	1-1/2	50	1.610	1.900	2-13/64	1-3/16	1-3/8
E996J	2	25	2.067	2.375	2-29/32	1-1/4	1-7/16
E996K	2-1/2	15	2.469	2.875	3-7/16	1-7/8	1-15/16
E996L	3	20	3.068	3.500	4-1/8	2	2-1/16
E996N	4	10	4.026	4.500	5-1/8	2-1/2	2-1/4

Reducer Bushings

For connecting different sizes of conduit. Bell x Spigot.



Cat. No.	Size (in.)	Std Ctn Qty	L	A	C
			Typical		
E950ED	3/4 x 1/2	100	1-5/32	13/64	1-1/32
E950FD-CAR	1 x 1/2	25	1-11/32	3/16	57/64
E950FE	1 x 3/4	100	1-11/32	3/16	1-1/64
E950GE-CAR	1-1/4 x 3/4	10	1-15/32	3/16	1-1/64
E950GF	1-1/4 x 1	50	1-15/32	3/16	1-9/64
E950HF-CAR	1-1/2 x 1	10	1-19/32	3/16	1-9/64
E950HG-CAR	1-1/2 x 1-1/4	10	1-19/32	3/16	1-17/64
E950JG-CAR	2 x 1-1/4	10	1-3/4	7/32	1-17/64
E950JH-CAR	2 x 1-1/2	10	1-3/4	7/32	1-25/64
E950KJ-CAR	2-1/2 x 2	10	2-5/32	3/8	1-27/64
E950LJ-CAR	3 x 2	10	2-1/8	1/4	1-7/8
E950LK	3 x 2-1/2	25	1-15/16	1/4	1-11/16
E950NL	4 x 3	25	2-3/4	5/16	1-15/16

Plugs with Pull Tabs (Polyethylene)

Cat. No.	Size (in.)	Std Ctn Qty	Std Ctn Wt. (lb)
P258JT	2	60	3
P258LT	3	30	3
P258NT	4	48	8
P258PT	5	30	6
P258RT	6	30	9

Threaded Adapters

Cat. No.	Size (in.)	Std Ctn Qty
E9842D [1]	1/2	25
E9842E [2]	3/4	25

[1] *Fits 3/4 in. sockets*
[2] *Fits 1 in. sockets*

LR31146

Typical Properties of Conduit Raw Material Compound

Thermal	ASTM Test	Typical Values
Coefficient of Thermal Expansion-inch/inch/°C (properties at 23°C)	D696	3.38 x 10^{-5}
Heat Distortion °C at 264 psi	D648	71°C
Thermal Conductivity BTU (hr.) (ft) (°C/in.)	N/A	1.3

Mechanical	ASTM Test	Typical Values
Specific Gravity	D792	1.43 – 1.6
Tensile Strength (psi) @ 23°C	D638	5,000 – 6,500
Izod Impact ft lb./in. of notch	D256	0.65 – 1.5
Flexural Strength (psi)	D790	12,500
Compressive Strength (psi)	D695	9,000
Hardness (Durometer D)	D2240	85

Electrical	ASTM Test	Typical Values
Dielectrical Strength volts/mil	D149	1100
Dielectric Constant 60 Hz @ 30°C	D150	4.00
Power Factor 60 Hz @ 30°C	D150	1.93

Impedance (Volts lost per ampere per 100 feet)	Ø3 90% P.F.	80% P.F.	Ø1 90% P.F.	80% P.F.
Steel Conduit	0.0118	0.0123	0.0136	0.0142
Schedule 40®	0.0105	0.0106	0.0121	0.0122

Using 250 kcmil copper conductor comparable values for other conductor sizes.

Wire Fill

Maximum number of conductors in Schedule 40 PVC conduit

(Based on Table1, Chapter 9 of the NEC)

Type Letters	Conductor Size AWG, kcmil	Conduit Trade Size													
		1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	4-1/4	5	6	8
THWN	14	13	24	39	69	94	154								
	12	10	18	29	51	79	114	164							
THHN	10	6	11	18	32	44	73	194	160						
	8	3	5	9	19	22	36	51	71	106	136				
FEP	6	1	4	6	11	15	26	37	57	76	98	125	154		
(14 thru 2)	4	1	2	4	7	9	16	22	35	47	60	75	94	137	236
	3	1	1	3	6	8	13	19	29	39	51	64	90	116	201
FEPB	2	1	1	3	5	7	11	16	25	33	43	54	67	97	169
(14 thru 4/0)	1		1	1	3	5	9	12	18	25	32	49	59	72	125
PFA	1/0		1	1	3	4	7	10	15	21	27	33	42	61	105
(14 thru 8)	2/0		1	1	2	3	6	8	13	17	22	29	35	51	88
	3/0		1	1	1	3	5	7	11	14	18	23	29	42	73
PFAH	4/050		1	1	1	2	4	6	9	12	15	19	24	35	61
(14 thru 4/0)	250			1	1	1	3	4	7	10	12	16	20	28	49
	300			1	1	1	3	4	6	8	11	13	17	24	42
Z	350			1	1	1	2	3	5	7	9	12	15	21	37
(14 thru 4/0)	400				1	1	1	3	5	6	8	10	13	19	33
	500				1	1	1	2	4	5	7	9	11	16	27
XHHW	600				1	1	1	1	3	4	5	7	9	13	22
(4 thru 500)	700					1	1	1	3	4	5	6	8	11	19
	750					1	1	1	2	3	4	6	7	11	19
XHHW	6	1	3	5	9	13	21	30	47	63	81	102	128	185	320
	600				1	1	1	1	3	4	5	7	9	13	22
	700					1	1	1	3	4	5	6	7	11	19
	750					1	1	1	2	3	4	6	7	10	18

Weight Comparaison

Carlon Schedule 40 rigid non-metallic conduit compared to other rigid conduit in pounds per 100 feet (approx.)

Nom. Size	Carlon Schedule 40® Rigid Non-metallic Conduit	Carlon Schedule 80® Rigid Non-metallic Conduit	Aluminum	Electrical Metallic Tubing (EMT)	Inter-mediate Metal Conduit (IMC)	Rigid Metal Conduit (RMC)
1/2	18	22	27	30	57	79
3/4	23	29	36	46	78	105
1	35	43	43	66	112	153
1-1/4	48	60	70	96	114	201
1-1/2	57	72	86	112	176	246
2	76	100	116	142	230	334
2-1/2	125	153	183	230	393	527
3	164	212	239	270	483	690
3-1/2	198		288	350	561	831
4	234	310	340	400	625	982
5	317	431	465	Not Made	Not Made	1344
6	412	592	612	Not Made	Not Made	1770

Expansion and Contraction

Temperature Considerations for Rigid Non-Metallic Conduit Compensation for Linear Expansion

Like all construction materials, PVC will expand or contract with variations in temperatures. The coefficient of linear expansion in PVC conduit is 3.38 x 10^{-5} in./in./°C as compared to 1.2 x 10^{-5} for aluminum and 0.6 x 10^{-5} for steel. An expansion fitting is needed whenever the change in length due to temperature variation will be 1/4 in. or greater.

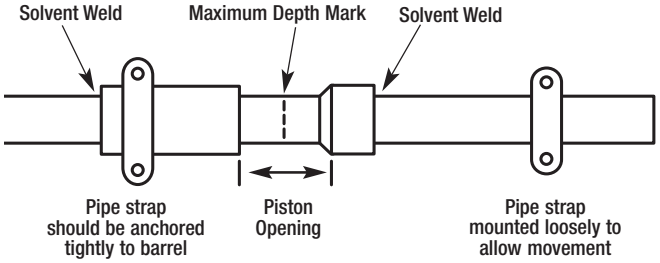
Add 1°C to the estimated temperature range when conduit is installed in direct sunlight to allow for radiant heating.

An expansion fitting consists of two sections, one telescoping inside another. When installing expansion fittings, alignment of piston and barrel is important. Be sure to mount expansion fitting level for best performance.

For a vertical run, the expansion fitting must be installed close to the top of the run with the barrel jointing down, in order that rain water does not run into the opening. The lower end of the conduit run must be secured at the bottom so that any length change due to temperature variation will result in an upward movement.

Expansion Characteristics of PVC Rigid Non-Metallic Conduit
Coefficient of Thermal Expansion = 3.38 x 10^{-5} in./in./°C

Temp. Change in Degrees F	Length Change in inches per 100 ft of PVC Conduit	Temp. Change in Degrees C	Length Change in inches per 100 ft of PVC Conduit	Temp. Change in Degrees C	Length Change in inches per 100 ft of PVC Conduit	Temp. Change in Degrees C	Length Change in inches per 100 ft of PVC Conduit
5	0.2	12.8	2.2	40.5	4.2	68.3	6.3
10	0.4	15.6	2.4	43.3	4.5	71.1	6.5
15	0.6	18.3	2.6	46.0	4.7	73.9	6.7
20	0.8	21.1	2.8	48.9	4.9	76.7	6.9
25	1.0	23.9	3.0	51.6	5.1	79.4	7.1
30	1.2	26.7	3.2	54.4	5.3	82.2	7.3
35	1.4	29.4	3.4	57.2	5.5	85.0	7.5
40	1.6	32.2	3.6	60.0	5.7	87.8	7.7
45	1.8	35.0	3.8	62.7	5.9	90.6	7.9
50	2.0	37.8	4.1	65.5	6.1	93.3	8.1



Determine the Piston Opening

The expansion joint must be installed to allow both expansion and contraction of the conduit run. The correct piston opening for any installation condition should use the following formula:

$$0 = \left[\frac{T\ max - T\ installed}{\Delta T}\right] E$$

Where:

0	=	Piston opening (in.)
T max	=	Maximum anticipated temperature of conduit (°C)
T inst.	=	Temperature of conduit at time of installation (°C)
Δ T	=	Total change in temperature of conduit (°C)
E	=	Expansion allowance built into each expansion fitting (in.)

Example

380 ft of conduit is to be installed on the outside of a building exposed to the sun in a single straight run. It is expected that the conduit will vary in temperature from -17°C in the winter to 60°C in the summer (this includes the -1°C for radiant heating from the sun). The installation is to be made at a conduit temperature of 32°C. From the table, a 60°C temperature change will cause a 5.7 in. length change in 100 ft of conduit. The total change for this example is 5.7" x 3.8 = 21.67" which should be rounded to 22". The number of expansion fittings will be 22" x fitting range (4" for Carlon trade sizes 1/2" through 1-1/2" and 8" for sizes 2" through 6".) If the E945D fitting is used, the number will be 22" x 4 = 5.50 which should be rounded to 6. The fitting should be placed at 62 ft intervals (380 x 6). The proper piston setting at the time of installation is calculated as explained above.

$$0 = \left[\frac{60°C - 32°C}{60°C}\right] 4.0 = 1.4\ in.$$

Insert the piston into the barrel to the maximum depth. Place a mark on the piston at the end of the barrel. To properly set the piston, pull the piston out of the barrel to correspond to the 2.1 in. calculated above. See drawing at lower left.

Summary

1. Anticipate expansion and contraction of PVC conduit in aboveground, exposed installation.
2. Use an expansion fitting when length change due to temperature variation will be 1/4" or greater.
3. PVC conduit expands 4.1" for each 100 feet of run and a 37.8°C temperature change.
4. Align expansion fitting with the conduit run to prevent binding.
5. Follow the instructions to set the piston opening.
6. Rigidly fix the outer barrel of the expansion fitting so it cannot move. Mount the conduit connected to the piston loosely enough to allow the conduit to move as the temperature changes.

(Revised)

Corrosion Resistance of Carlon® Schedule 40 and Schedule 80 Fittings

Carlon Schedule 40 and Schedule 80 Fittings are generally acceptable for use in environments containing the chemicals **below**. These environmental-resistance ratings are based upon tests where the specimens were placed in complete submergence in the reagent listed. Schedule 40 and Schedule 80 Fittings can be used in many process areas where chemicals not on this list are manufactured or used because worker safety requirements dictate that any air presence or splashing be at a very low level.

If there are any questions about specific suitability in a given environment, prototype samples should be tested under actual conditions.

CHEMICAL ENVIRONMENT

Acetic Acid 0 – 20%
Acetic Acid 20 – 30%
Acetic Acid 30 – 60%
Acetic Acid 80%
Acetic Acid – Glacial
Acetic Acid Vapors
Acetylene
Adipic Acid
Alum
Aluminum Chloride
Aluminum Fluoride
Aluminum Hydroxide
Aluminum Oxychloride
Aluminum Nitrate
Aluminum Sulfate
Ammonia-Dry Gas
Ammonium Bifluoride
Ammonium Carbonate
Ammonium Chloride
Ammonium Hydroxide 28%
Ammonium Metaphosphate
Ammonium Nitrate
Ammonium Persulfate
Ammonium Phosphate – Neutral
Ammonium Sulfate
Ammonium Sulfide
Ammonium Thiocyanate
Amyl Alcohol
Anthraquinone
Anthraquinonesulfonic Acid
Antimony Trichloride
Aqua Regia
Arsenic Acid 80%
Arylsulfonic Acid
Barium Carbonate
Barium Chloride
Barium Hydroxide
Barium Sulfate
Barium Sulfide
Beet – Sugar Liquor
Benzine Sulfonic Acid 10%
Benzoic Acid
Bismuth Carbonate
Black Liquor (Paper Industry)
Bleach – 12.5% Active CL2
Borax
Boric Acid
Brine
Breeder Pellets – Dane. Fish
Bromic Acid
Bromine – Water
Butane
Butadiene
Butyl Alcohol
Butyl Phenol
Butylene
Butyric Acid
Calcium Bisulfite
Calcium Carbonate
Calcium Chlorate
Calcium Chloride
Calcium Hydroxide
Calcium Hypochlorite
Calcium Nitrate
Calcium Sulfate
Carbonic Acid
Carbon Dioxide Gas – Wet
Carbon Dioxide – Aqueous Solution
Carbon Monoxide
Caustic Potash
Caustic Soda
Chloracatic Acid
Chloral Hydrate
Chlorine Gas (Dry)
Chlorine Gas (Moist)
Chlorine Water
Chlorosulfonic Acid
Chrome Alum
Chromic Acid 10%
Chromic Acid 30%
Chromic Acid 40%
Chromic Acid 50%
Citric Acid
Copper Chloride
Copper Cyanide
Copper Fluoride
Copper Nitrate
Copper Sulfate
Cottonseed Oil
Cresylic Acid 50%
Crude Oil – Sour
Crude Oil – Sweet
Demineralized Water
Dextrin
Dextrose
Diglycolic Acid
Disodium Phosphate
Ethyl Alcohol
Ethylene Glycol
Fatty Acids
Ferric Chloride
Ferric Nitrate
Ferric Sulfate
Ferrous Chloride
Ferrous Sulfate
Fluorine Gas – Wet
Fluorine Gas – Dry
Fluoroboric Acid
Fluorosilicic Acid
Formaldehyde
Formic Acid
Fructose
Gallic Acid
Gas – Coke Oven
Gas – Natural (Dry)
Gas – Natural (Wet)
Gasoline – Sour
Gasoline – Refined
Glucose
Glycerine (Glycerol)
Glycol
Glycolic Acid
Green Liquor (Paper Industry)
Heptane
Hexanol, Tertiary
Hydrobromic Acid 20%
Hydrochloric Acid 0% – 25%
Hydrochloric Acid 25% – 40%
Hydrocyanic Acid or Hydrogen Cyanide
Hydrofluoric Acid 10%
Hydrofluorosilicic Acid
Hydrogen Phosphide
Hydrogen Sulfide – Dry
Hydrogen Sulfide – Aqueous Solution
Hydroquinone
Hydroxylamine Sulfate
Iodine
Kerosene
Lactic Acid 28%
Lauric Acid
Lauryl Chloride
Lauryl Sulfate
Lead Acetate
Lime Sulfur
Linoleic Acid
Linseed Oil
Lubricating Oils
Magnesium Carbonate
Magnesium Chloride
Magnesium Hydroxide
Magnesium Nitrate
Magnesium Sulfate
Maleic Acid
Malic Acid
Mercuric Chloride
Mercuric Cyanide
Mercurous Nitrate
Mercury
Methyl Sulfate
Methylene Chloride
Mineral Oils
Naphthalene
Nickel Chloride
Nickel Nitrate
Nitric Acid, Anydrous
Nitric Acid 20%
Nitric Acid 40%
Nitric Acid 60%
Nitrobenzene
Nitrous Oxide
Oils and Fats
Oils – Petroleum – (See Type)
Oleic Acid
Oxalic Acid
Palmitic Acid 10%
Perchloric Acid 10%
Phenylhydrazine Hydrochloride
Phosgene, Gas
Phosphoric Acid – 0 – 25%
Phosphoric Acid – 25 – 50%
Phosphoric Acid – 50 – 85%
Photographic Chemicals
Plating Solutions
Potassium Bicarbonate
Potassium Bichromate
Potassium Borate
Potassium Bromide
Potassium Carbonate
Potassium Chloride
Potassium Chromate
Potassium Cyanide
Potassium Dichromate
Potassium Ferricyanide
Potassium Ferrocyanide
Potassium Fluoride
Potassium Hydroxide
Potassium Nitrate
Potassium Perborate
Potassium Perchlorite
Potassium Permanganate 10%
Potassium Persulfate
Potassium Sulfate
Propane
Propyl Alcohol
Silicic Acid
Silver Cyanide
Silver Nitrate
Silver Plating Solutions
Sodium Acetate
Sodium Arsenite
Sodium Benzoate
Sodium Bicarbonate
Sodium Bisulfate
Sodium Bisulfite
Sodium Bromide
Sodium Chlorate
Sodium Chloride
Sodium Cyanide
Sodium Dichromate
Sodium Ferricyanide
Sodium Ferrocyanide
Sodium Fluoride
Sodium Hydroxide
Sodium Hypochlorite
Sodium Nitrate
Sodium Nitrite
Sodium Sulfate
Sodium Sulfide
Sodium Sulfite
Sodium Thiosulfate (Hypo)
Stannic Chloride
Stannous Chloride
Stearic Acid
Sulfur
Sulfur Dioxide – Gas Dry
Sulfur Trioxide
Sulfuric Acid – 0 – 10%
Sulfuric Acid – 10 – 75%
Sulfuric Acid – 75 – 90%
Sulfurous Acid
Tannic Acid
Tanning Liquors
Tartaric Acid
Titanium Tetrachloride
Triethanolamine
Trimethyl Propane
Trisodium Phosphate
Turpentine
Urea
Vinegar
Whiskey
White Liquor (Paper Industry)
Wines
Zinc Chloride
Zinc Chromate
Zinc Cyanide
Zinc Nitrate
Zinc Sulfate

Thomas&Betts

United States
Tel: 901.252.8000
800.816.7809
Fax: 901.252.1354

Technical Services
Tel: 888.862.3289

www.tnb.com

All Weather – Clear

Recommended pipe application and sizes	Set-up time (Evaporation Rate)	Recommended installation temperature	Lap Shear @ 73˚F	Viscosity at 75˚ as manufactured
Recommended for all grades and types of Carlon PVC conduit, duct, wireway and fittings, except Flex-Plus® Blue™ ENT (Electrical Nonmetallic Tubing.) **Up through 6" diameter.**	**-5˚–10˚F** 6-8 minutes **10˚–30˚F** 4-5 minutes **30˚–50˚F** 3-4 minutes **50˚–70˚F** 1-2 minutes **70˚–90˚F** 1/2-1 1/2 minutes	-5˚ to 100˚F	**2 hrs.** 350 psi **16 hrs.** 800 psi **72 hrs.** 1,500 psi	400-700 cps

Part No	Size	Applicator	Description	Ctn. Qty.	Ctn. Wt. (lbs.)
VC9984	1/2 Pint	Dauber	All Weather "Quick-Set" Cement	10	7.0
VC9983	Pint	Dauber	All Weather "Quick-Set" Cement	24	30.0
VC9982	Quart	Dauber	All Weather "Quick-Set" Cement	12	29.0
VC9981P	Gallon	–	All Weather "Quick-Set" Cement	6	54.0

Meets ASTM D-2564

All Weather – ENT Blue

Recommended pipe application and sizes	Set-up time (Evaporation Rate)	Recommended installation temperature	Lap Shear @ 73˚F	Viscosity at 75˚ as manufactured
Required for use with Flex-Plus® Blue™ ENT (Electrical Nonmetallic Tubing), Riser-Gard®, P&C Flex®, and Carlon PVC fittings. **Up through 6" diameter.**	**-5˚–10˚F** 6-8 minutes **10˚–30˚F** 4-5 minutes **30˚–50˚F** 3-4 minutes **50˚–70˚F** 1-2 minutes **70˚–90˚F** 1/2-1 1/2 minutes	-5˚ to 100˚F	**2 hrs.** 350 psi **16 hrs.** 800 psi **72 hrs.** 1,500 psi	400-700 cps

Part No	Size	Applicator	Description	Ctn. Qty.	Ctn. Wt. (lbs.)
VC9992	Quart	Dauber	All Weather "Quick-Set" Blue	12	29.0

Meets ASTM D-2564

Resi-Gard® – Clear

Recommended pipe application and sizes	Set-up time (Evaporation Rate)	Recommended installation temperature	Lap Shear @ 73˚F	Viscosity at 75˚ as manufactured
For use with Resi-Gard®, Riser-Gard®, P&C Flex®, and Carlon PVC fittings. **Up through 6" diameter.**	**10˚–30˚F** Use extra caution **30˚–50˚F** 5-6 minutes **50˚–70˚F** 3-4 minutes **70˚–90˚F** 1-2 minutes	40˚ to 100˚F	**2 hrs.** 350 psi **16 hrs.** 800 psi **72 hrs.** 1,500 psi	500-900 cps

Part No	Size	Applicator	Description	Ctn. Qty.	Ctn. Wt. (lbs.)
VC9963SC	Pint	Brush	Resi-Gard® Solvent Cement Clear	24	28.0

Meets ASTM D-2564

Clear Primer

Recommended pipe application and sizes	Recommended installation temperature
Recommended for use with Carlon cement	5˚ to 100˚F

Part No	Size	Applicator	Ctn. Qty.	Ctn. Wt. (lbs.)
VC9903	Pint	Dauber	24	27.0
VC9902	Quart	Dauber	12	25.0

Meets ASTM F-686

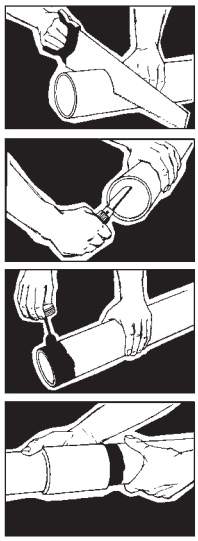
Purple Primer

Recommended pipe application and sizes	Recommended installation temperature
Recommended for use with Carlon cement	5˚ to 100˚F

Part No	Size	Applicator	Ctn. Qty.	Ctn. Wt. (lbs.)
VC9932	Quart	Dauber	12	25.0

Meets ASTM F-686

Cement Joints



Carlon nonmetallic products are joined by means of solvent cement joints. Sizes 1/2" through 1 1/2" should be cut square (using a fine tooth handsaw) and deburred. For sizes 2" through 6" a miter box or similar saw guide should be utilized to keep the material steady. After cutting and deburring, wipe ends clean of dust, dirt and shavings.

Joining process as follows: Be sure that conduit end is clean and dry. Apply coat of Carlon Solvent Cement (use dauber) to end of conduit, the length of the socket to be attached. Push conduit firmly into fitting while rotating conduit slightly about one-quarter turn to spread cement evenly. Allow joint to set approximately 10 minutes.

Carlon recommends the use of Carlon cement for proper solvent cement joints. Since this cement is prepared particularly for our product compounds and tolerances, we cannot guarantee joints assembled with cement materials supplied by other manufacturers. Regular grade grey solvent cement will accommodate most application situations being of a general purpose nature. In situations requiring an extremely fast-setting joint, (low temperature or difficult installation conditions) Carlon All Weather Quick-Set Cement is recommended. Standard grade clear cement is recommended for noncritical utility applications where gap filling and leak testing are not required.

Average number of joints per can

Pipe size	1/2 Pint 8 oz.	Pint 16 oz.	Quart 32 oz.	Gallon 128 oz.	Spray 4 oz.	Spray 16 oz.
1/2	140	275	550	2,200	70	275
3/4	90	180	360	1,440	45	180
1	70	140	280	1,120	35	140
1 1/4	50	100	200	800	25	100
1 1/2	37	75	150	600	18.5	75
2	20	40	80	320	10	40
2 1/2	17	35	70	280	8.5	35
3	15	30	60	240	7.5	30
3 1/2	13	27	54	216	6.5	27
4	12	25	50	200	6	25
5	9	19	38	150	N/A	N/A
6	6	12	24	95	N/A	N/A

CAN: Average shelf-life of all Carlon cement is 24 months (unopened cans stored below 80°F.)

SPRAY: Average shelf-life of all Carlon Spray PVC Cement is 3 years.

All Carlon cements are specially formulated to be used with Carlon PVC products, and do not require primers when parts are clean of dirt and moisture.

Cementing PVC Conduit:

1. Make square saw cut with fine tooth saw.
2. Deburr and round inside edge of the cut end.
3. Clean socket ID and spigot OD of dirt and moisture.
4. Apply a uniform coat of cement to spigot end and push onto socket bottom, rotating 1/4 turn.
5. Allow time to set before disturbing. This will depend upon temperature.

Cementing PVC Conduit for Submerged Areas Requiring Air or Water Tightness:

1. Follow the procedure to the left for cementing conduit.
2. Test workmanship by conducting a low pressure air (3.0 - 5.0 psi) test after system is installed and cemented joints are set.
3. Plug and block ends to prevent movement prior to pressurization.
4. Check for leaks with soap solution.
5. Even low pressure air can cause high thrust loads and caution must be observed.

Cementing ENT for Concrete-Tight Applications:

1. Use Carlon Socket tight fittings or couplings.
2. ***Do not*** use chemical primer or cleaner.
3. Apply a light uniform coat of cement, labeled for use with ENT.
4. ***A brush*** shall be used to apply the cement.
5. Brush excess cement out of ENT grooves
6. Promptly insert ENT into fitting while cement is wet, until the fitting stop is reached, and give 1/4 turn.
7. Do not disturb until the joint is set.

MSDS available at **www.carlon.com**

Carlon®
LAMSON & SESSIONS

2F18 SP 7.5M 7/07

Ground rods

Galvanized ground rods

- Made of high-strength quality cold-drawn steel (1035) hot dip galvanized
- Meets ANSI CI35.30-1979 requirements
- Stainless steel rods are also available (for more detailed information, contact your ABB regional sales office)

	Trade size		Rod size (nominal diameter x length)		Plating thickness		Weight per 100	
Cat. no.	in.	ft.	mm	m	(mils)	Standard packaging	lb	kg
GR5006	½	6	12.7	1.8	4	10	410	186
GR6256	⅝	6	15.8	1.8	4	5	600	272
GR6258 (0.620 – 0.630)	⅝	8	15.8	2.4	4	5	800	363
GR6250 (0.555 – 0.565)	⅝	10	15.8	3.0	4	5	1,000	454
GR6260 (0.620 – 0.630)	⅝	10	15.8	3.0	4	5	1,000	454
GR7506	¾	6	17.3	1.8	4	5	700	318
GR7508 (0.745 – 0.755)	¾	8	17.3	2.4	4	5	1,200	545
GR7510 (0.745 – 0.755)	¾	10	17.3	3.0	4	5	1,500	681

Copper-bonded steel ground rods

- All EZGround ground rods have a heavy uniform covering of electrolytic copper bonded to a rigid steel core
- Copper ions are forced electrically to join with the steel core, establishing a corrosion-resistant bond between the copper and the steel

	Trade size		Rod size (nominal diameter x length)		Plating thickness		Weight per 100	
Cat. no.	in.	ft.	mm	m	(mils)	Standard packaging	lb	kg
5005	½	5	12.7	1.5	10	10	305	138
5006	½	6	12.7	1.8	10	5	370	168
5008	½	8	12.7	2.4	10	5	545	247
5010	½	10	12.7	3.0	10	5	611	277
6256	⅝	6	15.8	1.8	10	5	508	230
6258*	⅝	8	15.8	2.4	10	5	678	308
6260*	⅝	10	15.8	3.0	10	5	847	384
7508*	¾	8	17.3	2.4	10	5	992	450
7510*	¾	10	17.3	3.0	10	5	1,240	462
1010*	1	10	25.4	3.0	10	1	2,248	1,020

* Ground rods are UL listed (425H), except for regular rods shorter than 8 ft. or less than ½ in.
cULus lists rods ½ in. and larger, 10 ft. and longer.

Knurling die for 14- and 15-ton tools

Cat. no.	Description
15508SS	For ⅝ in. and ¾ in. ground rods

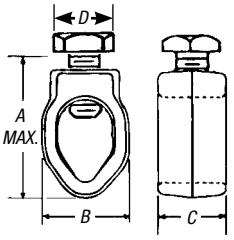
Used to knurl ground rods in order to increase the pullout value of the compression connection by as much as 20%. Use hand knurling tool cat. no. 240-31565-94 for all ground rods.

Ground Rod Clamps

UL Listed for both copper-clad and galvanized ground rods.

Type JWR — Wide-Range Ground Rod Clamp

- UL Listed for direct burial in earth/concrete
- Constructed from bronze alloy and high-performance stainless steel bolt
- Provides wide range of connection sizes
- More than 300 lbs. torque capacity



DB

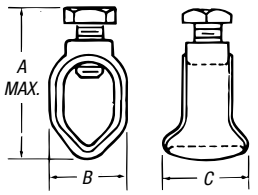
CAT. NO.	NOMINAL ROD DIA. (IN.)	NOMINAL ROD DIA. (MM)	WIRE RANGE MAX.	WIRE RANGE MIN.	WIRE RANGE MAX. (MM²)	DIMENSIONS (IN.) MIN. (MM²)	A (MAX.) BOLT	B	C	D
JWR	3/8*	9.5	1/0 Str.	10 Sol.	53.4	5.2	1.535	1.050	.812	.652
	1/2	12.7	1/0 Str.	10 Sol.	53.4	5.2	1.535	1.050	.812	.652
	5/8	15.8	1/0 Str.	10 Sol.	53.4	5.2	1.535	1.050	.812	.652
	3/4	19.0	1/0 Str.	8 Sol.	53.4	8.3	1.535	1.050	.812	.652

** 3/8" rod not recognized/listed by UL.*

Long bearing surface of clamp on ground wire secures ground connection.

Type JAB — Ground Rod Clamps

- Cast of high-strength corrosion-resistant copper alloy
- Both hex head bolts and socket set screws available
- UL Listed for direct burial



TYPE JABH

DB

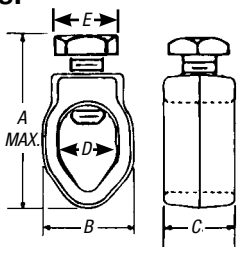
CAT. NO. SOCKET SET SCREW	CAT. NO. HEX HEAD BOLT	NOMINAL ROD DIA. (IN.)	NOMINAL ROD DIA. (MM)	WIRE RANGE MAX.	WIRE RANGE MIN.	WIRE RANGE MAX. (MM²)	WIRE RANGE MIN. (MM²)	DIMENSIONS (IN.) A (MAX.) SOCKET SCREW	A (MAX.) HEX BOLT	SCREW THREAD SIZE UNC-2A	B	C	D
JAB12*	JAB12H	1/2	12.7	2 Str.	10 Sol.	33.6	5.2	1 19/32	2 3/32	7/16–14	27/32	7/8	19/32
JAB58	JAB58H	5/8	15.8	1/0 Str.	8 Sol.	53.4	8.3	1 27/32	2 13/64	7/16–14	29/32	1	11/16
JAB34	JAB34H	3/4	19.0	1/0 Str.	8 Sol.	53.4	8.3	2	2 11/32	7/16–14	11/16	1	51/64
—	JAB34C	3/4 + 5/8	15.8 to 19.0	4/0 Str.	8 Sol.	95.0	8.3	—	2 11/32	7/16–14	1 1/8	1 1/32	13/16
JAB1	JAB1H	1	25.0	4/0 Str.	8 Sol.	107.1	8.3	2 1/4	3	7/16–14	1 11/32	1 1/16	1

** Not CSA listed* *Add suffix P to Cat. No. for tin-plated clamp.*

A dependable ground connection offered at a substantial savings.

Type G — Budget-Line Ground Clamps

- Cast of high-strength corrosion-resistant copper alloy
- Furnished with hex head bolts
- Simplified, compact design makes lasting, trouble-free connection
- UL Listed for direct burial



DB

CAT. NO.	NOMINAL ROD DIA. (IN.)	NOMINAL ROD DIA. (MM)	WIRE RANGE MAX.	WIRE RANGE MIN.	WIRE RANGE MAX. (MM²)	WIRE RANGE MIN. (MM²)	DIMENSIONS (IN.) A (MAX.) BOLT	SCREW THREAD SIZE UNC-2A	B	C	D	E
G3*	3/8	9.5	4 Str.	10 Sol.	21.1	5.2	1 3/8	5/16–18	1 1/16	1/2	27/64	3/8
G4	1/2	12.7	2 Str.	10 Sol.	33.6	5.2	—	3/8–16	27/32	3/8	37/64	1/2
G5‡	5/8	15.8	2 Str.	10 Sol.	33.6	5.2	—	3/8–16	29/32	3/8	43/64	1/2
G6	3/4	19.0	2 Str.	10 Sol.	33.6	5.2	—	3/8–16	1 1/16	3/8	13/16	1/2

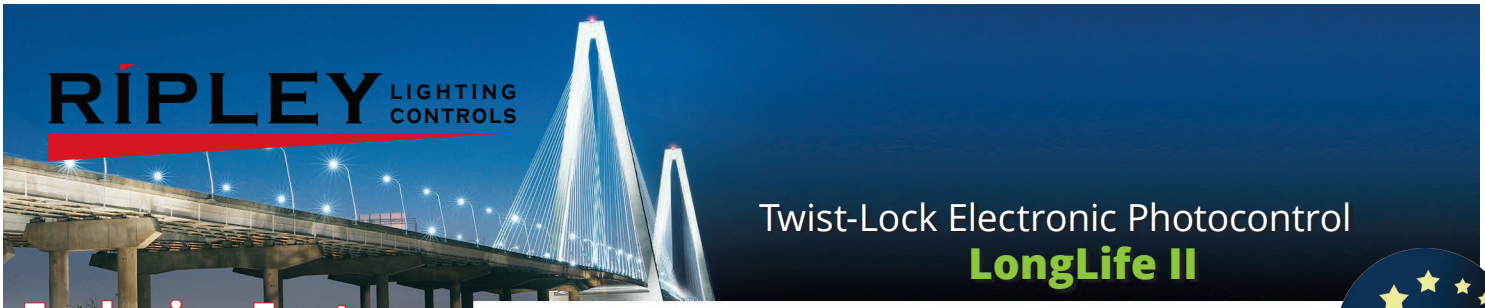
** Not UL Listed.* *‡ RUS Accepted.* *Add suffix P to Cat. No. for tin-plated clamp.*

Thomas&Betts

United States
Tel: 901.252.8000
800.816.7809
Fax: 901.252.1354

Technical Services
Tel: 888.862.3289

www.tnb.com



RIPLEY LIGHTING CONTROLS

Twist-Lock Electronic Photocontrol
LongLife II

IDA APPROVED Dark-Sky Friendly® Fixture

Exclusive Features

ZCS TECHNOLOGY
Zero Cross Switching

Zero Cross Switching Technology: protects the device from inrush currents, commonly found in LED Luminaires.

Microprocessor Control

Intelligent Microprocessor: assures advanced Performance & Reliability

Self-Healing Relay

SELF-Healing Relay: allows unattended field restoration. Stuck relay contacts are a common failure point. Our Patent Pending technology actually works to un-stick the contacts, thus preventing wasted energy (day burners) and service calls. Tested at more than 325 years with a 1000 Watt Tungsten Lamp

3 Tier Power Supply Technology

3 Tier Power Supply Circuitry: 640 Joule 33 mm MOV rated @ 40,000 Amps for primary protection Dual Zener Diode for secondary protection. 3rd Layer of protection using a precision voltage regulator.

TRU Filter

Tru-Filter®: spectral sensitivity matches that of the Human Eye; while competitor's Silicon Photodetecto comes nowhere close.

Phone: 803-939-4700
Fax: 803-939-4777
E-mail: Sales@RipleyLC.com

www.RipleyLC.com

Ripley's exclusive LongLife II Photocontrol

"NEW Generation of Technologies that change the Game"

Ripley Lighting Controls is pioneering new technologies raising the bar in the Street and Area Lighting Industry.

	6390LL-BK	6394LL	6395LL
Nominal Voltage 60 Hz	120/208/240/277	480	347
Voltage Range	105—305	432—528	312—382
Fail Mode	On		
Load Rating	1000 Watt Tungsten / 1800 VA Ballast		
Operating Temperature	-40C to +70C (-40F to +158F)		
Photocell	Infrared Filtering Silicon Phototransistor		
Dielectric Strength	5000 Volts between current carrying parts and metal surfaces		
Surge Protection	Primary: 640 Joule MOV rated at 40,000 amp surge current—protects not only the photocontrol, but also the LED fixture Secondary: 2 Zener diodes Third: Voltage Regulator		
Power Consumption	0.5 watts @ 120 V		
Time Delay Off (Instant On)	3 to 5 seconds		
Operating Light Levels (Standard Settings)	Turn On 1.5 FC ± .25 / Turn Off by 2.25 FC (Off:On Ratio = 1.5:1)		
ANSI Color Coded Cover: double-wall thickness, UV Stabilized Permanent Color LongLife polymer with extra UV inhibitor	Black	Yellow	Green
Options			
Fail Off	-FO (Green)	N/A	N/A
Freguency	60Hz		
Applicable with	HID INDUCTION LED		

Other Exclusive Features:

- Electrolytic Capacitors rated 105 °C, with minimum 20,000 hour life at maximum voltage, current, & temperature
- Completed circuit boards are conformal coated with silicone for Long Life
- Double-wall thickness for strength and longevity in constant outdoor environment, optimized black Long Life polymer with maximum UV inhibitor
- 1:1 Ratio Capable saves energy by reducing burn time. Allows for the light to turn off at the same light level as the turn on value.
- RoHS Compliant & packaged in Biodegradable Bags
- WARRANTY: 12 years from date of manufacture

Meets or exceeds rigid quality requirements of SouthConn Technologies Inc. and applicable ANSI C136.10, and C136.24 and C136.41

PS-6100-045
LongLife
020616
Rev. 7

RoHS

Catalog #	Colorado Springs Traffic-
Project name	Bent Grass and Meridian
Prepared by	ESU-FA012M03240M-150FJU1-1512N

Approved
By:Jeff Rice
Date:11/14/2020
El Paso County Planning & Community Development

SL3x M
Roadway Lighting Luminaire

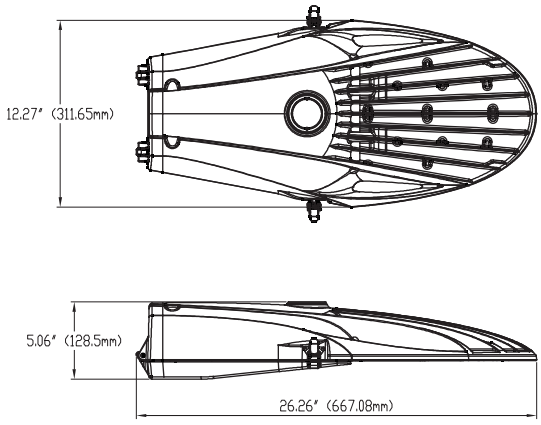
PRODUCT OVERVIEW

APPLICATIONS

Roadway Lighting

Parking Lot Lighting

DIMENSIONS



Effective Projected Area (EPA): 0.66 sq. ft. max. (0.061 sq. m.)
Approximate Net Weight: 18.7 lbs. (8.48 kgs.)

PRODUCT SPECIFICATIONS

OPTICAL

Ideal LED replacement for 150-310W HPS roadway

Precision optical lens design

Photometric distributions available in Type II, III, III Wide, and V

Standard 4000K CCT/ 70 CRI minimum, 3000K CCT/ 70 CRI minimum

IP66 rated LED light engines

ELECTRICAL

120-277V 50/60Hz operation; 347-480V is also available

Standard 0-10V dimming; DALI dimming option available

10kV/5kA Surge protection meets IEEE/ ANSI C62.41, ANSI C136.2-2015

20kV/10kA SPD is also available

CONSTRUCTION

Classic and modern cobra-head style design

Heavy-duty die-cast aluminum housing and door

Arm mount is adjustable from 1-1/4" to 2" (1-5/8" to 2-3/8"O.D.) diameter

Slipfitter with ± 5 degree of adjustment for leveling

Standard two-bolt/ one-bracket slipfitter provides 3G vibration rating per ANSI C136.10-2001

Tool-less entry for easy installation and maintenance

CONTROL

NEMA 3-pin photocontrol receptacle is standard

Advance 7-pin photocontrol receptacle available to meet ANSI C136.41

WARRANTY

Ten-year warranty*

* See your sales representative for warranty terms and conditions

RATING AND CERTIFICATIONS

UL and cUL Wet Location Listed

DesignLights Consortium® (DLC) Qualified Product[1]

Dark Sky Compliant (<3000K CCT only)

Rated for -40°C to +50°C ambient (-40°F to +130°F ambient)

Certified to ANSI C136.31-2001 3G Vibration

Meets FCC Part 15, Subpart B, Class A Standards

Meets Buy American Requirements within ARRA

RoHS Compliant

Complies with ANSI: C136.2, C136.10, C136.14, C136.31, C136.15, C136.37

1. Not available in 1300mA and 1500mA drive current models

EXCELLENCE OPTO. INC.
EOI Group
21858 Garcia Lane, City of Industry, CA 91789, U.S.A.
T: 909-468-0550 E: sales@eoius.com
F: 909-468-0554 W: http://www.eoius.com/streetlight

Catalog #	
Project name	
Prepared by	

SL3x M
Roadway Lighting Luminaire

PERFORMANCE TABLE

			Color Temp. 4000K			Color Temp. 3000K		
LED Number	Light Distribution	Drive Current (mA)	Flux (lm)	Power (W)	BUG Rating	Flux (lm)	Power (W)	BUG Rating
32	Type II	700	9191	71	B3-U0-G3	8296	71	B3-U0-G3
		1050	12803	110	B3-U0-G3	11555	110	B3-U0-G3
		1300	14932	134	B3-U0-G3	13478	134	B3-U0-G3
		1500	16628	155	B3-U0-G3	15006	155	B3-U0-G3
	Type III	700	9291	71	B3-U0-G3	8386	71	B3-U0-G3
		1050	12943	110	B3-U0-G3	11681	110	B3-U0-G3
		1300	15094	134	B3-U0-G3	13624	134	B3-U0-G3
		1500	16808	155	B3-U0-G3	15169	155	B3-U0-G3
	Type III Wide	700	8792	71	B1-U0-G2	7935	71	B1-U0-G2
		1050	12247	110	B2-U0-G2	11053	110	B2-U0-G2
		1300	14283	134	B2-U0-G3	12892	134	B2-U0-G2
		1500	15905	155	B2-U0-G3	14353	155	B2-U0-G3
	Type V	700	9091	71	B3-U0-G2	8206	71	B3-U0-G2
		1050	12664	110	B4-U0-G2	11430	110	B4-U0-G2
		1300	14770	134	B4-U0-G2	13331	134	B4-U0-G2
		1500	16447	155	B4-U0-G2	14842	155	B4-U0-G2

Information shown above is based on nominal system data. Initial delivered lumens at 25°C (77°F). Actual performance may differ as a result of end-user environment and application. Specifications subject to change without notice.

LUMEN MAINTENANCE

Model	TM-21 Lumen Maintenance (50,000 hours)	TM-21 Lumen Maintenance (100,000 hours)	Theoretical L70 (Hours)
700 mA	92.66%	85.72%	230,260 hrs
1050 mA	93.03%	87.07%	264,980 hrs
1500 mA	86.55%	74.78%	122,610 hrs

Projected lumen maintenance per IES TM-21 at 25°C ambient and based on LM-80 (10,000 hour testing).

ORDERING INFORMATION

ESU- F 032 M-

Product Family	Product Series	Input Voltage	Light Distribution	LED Number	Color Temperature	Luminaire Type	Drive Current
ESU – e-lite star™ LED Street Light	**F** – SL3x Series	**A01** – 120~277VAC **A02** – 347~480VAC	**2M** – Type II Medium **3M** – Type III Medium **3P** – Type III Medium Wide **5M** – Type V Medium	**032** – 32 LEDs	**30** – 3000K **40** – 4000K	**M** – 2-Modules	**700** – 700 mA **105** – 1050 mA **130** – 1300 mA **150** – 1500 mA

ACCESSORY OPTIONS

F U 1- N

LED Type	Finish	Safety Certificate	Door Entry	Driver Option	Control Option	SPD Rating	Additional Option	Additional Option
F	**A** – Gray (FS36173) **B** – Bronze (RAL 8019) **I** – Light Gray (RAL 7038) **J** – Black (RAL 9017)	**U** – UL	**1** – Tool Less	**1** – 0-10V **4** – 3 Ways Field Adjustable Selector **5** – DALI	**N** – None **1** – 3-Pin Photocontrol Receptacle **2** – Regular Photocontrol **3** – Shorting Cap **4** – Long Life Photocontrol **5** – 7-Pin Photocontrol Receptacle **6** – 7-Pin PCR & Shorting Cap **8** – 7-Pin PCR & Long Life Photocontrol **9** – 5-Pin Photocontrol Receptacle	**1** – 10kV/5kA **3** – 20kV/10kA **4** – 20kV/10kA FTO	**N** – None **1** – House Side Shield **2** – Bird Guard **3** – House Side Shield & Bird Guard **6** – 6' Pre-wire	**N** – None

Please contact your sales representative for the latest product information.

Mountain States Lighting
P.O. Box 449, Conifer, CO 80433
(303) 838-4430

EXCELLENCE OPTO. INC.
EOI Group
21858 Garcia Lane, City of Industry, CA 91789, U.S.A.
T: 909-468-0550 E: sales@eoius.com
F: 909-468-0554 W: http://www.eoius.com/streetlight

Verify approval by MVEA

U5200-XL

Unmetered Small Closing Plate Single Pedestal Direct Bury

SPECIFICATIONS

Brand Name	Milbank
Type	Unmetered Power Supply
Application	RV Power
Standard	UL Listed;Type 3R
Voltage Rating	Up to 240 Volts Alternating Current
Amperage Rating	125 Continuous Ampere
Phase	1 Phase
Frequency Rating	60 Hertz
Size	5.188L x 8.688W x 64.5H
Number of Main Breakers	0
Main Breaker Size	Breaker Provision
Cable Entry	Overhead or Underground
Terminal	Double Mechanical
Insulation	Glass Polyester
Mounting	Pedestal
Material	G90 Galvanized Steel with Powder Coat Finish
Number of Jaws	0 Terminals
Bypass Provision	No Bypass
Number of Meter Positions	Single Power Head
Equipment Ground	2 Barrel Ground Lug and Ground Bar
Hub/Closing Plate	Small Closing Plate
Line Side Wire Range	6 AWG - 350 kcmil
Number Branch Circuits	6
Number Of Receptacles	0
Height	64.5 IN
Length	5.188 IN
Width	8.688 IN

Appears In:

Georgia/Alabama Area

Please consult serving utility for their requirements prior to ordering or installing, as specifications and approvals vary by utility and may require local electrical inspector approval. All installations must be installed by a licensed electrician and must comply

with all national and local codes, laws and regulations. Milbank reserves the right to make changes in specifications and features shown without notice or obligation.