

DO NOT MARK on these MATERIALS

National Electric Code Reference Materials¹

**2015 National FFA
Agricultural Technology and Mechanical Systems CDE
Electrical Skills Activity**

¹ These materials are for CDE reference only. Consult the full *National Electrical Code* and local requirements for complete information.

Informational Note: Refer to Article 353 for High Density Polyethylene Conduit: Type HDPE, and Article 355 for Reinforced Thermosetting Resin Conduit: Type RTRC.

352.2 Definition.

Rigid Polyvinyl Chloride Conduit (PVC). A rigid nonmetallic raceway of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables.

352.6 Listing Requirements. PVC conduit, factory elbows, and associated fittings shall be listed.

II. Installation

352.10 Uses Permitted. The use of PVC conduit shall be permitted in accordance with 352.10(A) through (I).

Informational Note: Extreme cold may cause some non-metallic conduits to become brittle and, therefore, more susceptible to damage from physical contact.

(A) Concealed. PVC conduit shall be permitted in walls, floors, and ceilings.

(B) Corrosive Influences. PVC conduit shall be permitted in locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the materials are specifically approved.

(C) Cinders. PVC conduit shall be permitted in cinder fill.

(D) Wet Locations. PVC conduit shall be permitted in portions of dairies, laundries, canneries, or other wet locations, and in locations where walls are frequently washed, the entire conduit system, including boxes and fittings used therewith, shall be installed and equipped so as to prevent water from entering the conduit. All supports, bolts, straps, screws, and so forth, shall be of corrosion-resistant materials or be protected against corrosion by approved corrosion-resistant materials.

(E) Dry and Damp Locations. PVC conduit shall be permitted for use in dry and damp locations not prohibited by 352.12.

(F) Exposed. PVC conduit shall be permitted for exposed work. PVC conduit used exposed in areas of physical damage shall be identified for the use.

Informational Note: PVC Conduit, Type Schedule 80, is identified for areas of physical damage.

(G) Underground Installations. For underground installations, PVC shall be permitted for direct burial and underground encased in concrete. See 300.5 and 300.50.

(H) Support of Conduit Bodies. PVC conduit shall be permitted to support nonmetallic conduit bodies not larger

than the largest trade size of an entering raceway. These conduit bodies shall not support luminaires or other equipment and shall not contain devices other than splicing devices as permitted by 110.14(B) and 314.16(C)(2).

(I) Insulation Temperature Limitations. Conductors or cables rated at a temperature higher than the listed temperature rating of PVC conduit shall be permitted to be installed in PVC conduit, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the PVC conduit.

352.12 Uses Not Permitted. PVC conduit shall not be used under the conditions specified in 352.12(A) through (E).

(A) Hazardous (Classified) Locations. In any hazardous (classified) location, except as permitted by other articles of this Code.

(B) Support of Luminaires. For the support of luminaires or other equipment not described in 352.10(H).

(C) Physical Damage. Where subject to physical damage unless identified for such use.

(D) Ambient Temperatures. Where subject to ambient temperatures in excess of 50°C (122°F) unless listed otherwise.

(E) Theaters and Similar Locations. In theaters and similar locations, except as provided in 518.4 and 520.5.

352.20 Size.

(A) Minimum. PVC conduit smaller than metric designator 16 (trade size ½) shall not be used.

(B) Maximum. PVC conduit larger than metric designator 155 (trade size 6) shall not be used.

Informational Note: The trade sizes and metric designators are for identification purposes only and do not relate to actual dimensions. See 300.1(C).

352.22 Number of Conductors. The number of conductors shall not exceed that permitted by the percentage fill specified in Table 1, Chapter 9.

Cables shall be permitted to be installed where such use is not prohibited by the respective cable articles. The number of cables shall not exceed the allowable percentage fill specified in Table 1, Chapter 9.

352.24 Bends — How Made. Bends shall be so made that the conduit will not be damaged and the internal diameter of the conduit will not be effectively reduced. Field bends shall be made only with identified bending equipment. The radius of the curve to the centerline of such bends shall not be less than shown in Table 2, Chapter 9.

352.26 Bends — Number in One Run. There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.

352.28 Trimming. All cut ends shall be trimmed inside and outside to remove rough edges.

352.30 Securing and Supporting. PVC conduit shall be installed as a complete system as provided in 300.18 and shall be fastened so that movement from thermal expansion or contraction is permitted. PVC conduit shall be securely fastened and supported in accordance with 352.30(A) and (B).

(A) Securely Fastened. PVC conduit shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, conduit body, or other conduit termination. Conduit listed for securing at other than 900 mm (3 ft) shall be permitted to be installed in accordance with the listing.

(B) Supports. PVC conduit shall be supported as required in Table 352.30. Conduit listed for support at spacings other than as shown in Table 352.30 shall be permitted to be installed in accordance with the listing. Horizontal runs of PVC conduit supported by openings through framing members at intervals not exceeding those in Table 352.30 and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

Table 352.30 Support of Rigid Polyvinyl Chloride Conduit (PVC)

Conduit Size		Maximum Spacing Between Supports	
Metric Designator	Trade Size	mm or m	ft
16–27	½–1	900 mm	3
35–53	1¼–2	1.5 m	5
63–78	2½–3	1.8 m	6
91–129	3½–5	2.1 m	7
155	6	2.5 m	8

352.44 Expansion Fittings. Expansion fittings for PVC conduit shall be provided to compensate for thermal expansion and contraction where the length change, in accordance with Table 352.44, is expected to be 6 mm (¼ in.) or greater in a straight run between securely mounted items such as boxes, cabinets, elbows, or other conduit terminations.

352.46 Bushings. Where a conduit enters a box, fitting, or other enclosure, a bushing or adapter shall be provided to protect the wire from abrasion unless the box, fitting, or enclosure design provides equivalent protection.

Informational Note: See 300.4(G) for the protection of conductors 4 AWG and larger at bushings.

352.48 Joints. All joints between lengths of conduit, and between conduit and couplings, fittings, and boxes, shall be made by an approved method.

352.56 Splices and Taps. Splices and taps shall be made in accordance with 300.15.

352.60 Grounding. Where equipment grounding is required, a separate equipment grounding conductor shall be installed in the conduit.

Exception No. 1: As permitted in 250.134(B), Exception No. 2, for dc circuits and 250.134(B), Exception No. 1, for separately run equipment grounding conductors.

Exception No. 2: Where the grounded conductor is used to ground equipment as permitted in 250.142.

III. Construction Specifications

352.100 Construction. PVC conduit shall be made of rigid (nonplasticized) polyvinyl chloride (PVC). PVC conduit and fittings shall be composed of suitable nonmetallic material that is resistant to moisture and chemical atmospheres. For use aboveground, it shall also be flame retardant, resistant to impact and crushing, resistant to distortion from heat under conditions likely to be encountered in service, and resistant to low temperature and sunlight effects. For use underground, the material shall be acceptably resistant to moisture and corrosive agents and shall be of sufficient strength to withstand abuse, such as by impact and crushing, in handling and during installation. Where intended for direct burial, without encasement in concrete, the material shall also be capable of withstanding continued loading that is likely to be encountered after installation.

352.120 Marking. Each length of PVC conduit shall be clearly and durably marked at least every 3 m (10 ft) as required in the first sentence of 110.21(A). The type of material shall also be included in the marking unless it is visually identifiable. For conduit recognized for use aboveground, these markings shall be permanent. For conduit limited to underground use only, these markings shall be sufficiently durable to remain legible until the material is installed. Conduit shall be permitted to be surface marked to indicate special characteristics of the material.

Informational Note: Examples of these markings include but are not limited to “limited smoke” and “sunlight resistant.”

Table C.10 Maximum Number of Conductors or Fixture Wires in Rigid PVC Conduit, Schedule 40 and HDPE Conduit (Based on Chapter 9: Table 1, Table 4, and Table 5)

Type	Conductor Size (AWG/ kcmil)	Trade Size (Metric Designator)													
		3/8 (12)	1/2 (16)	3/4 (21)	1 (27)	1 1/4 (35)	1 1/2 (41)	2 (53)	2 1/2 (63)	3 (78)	3 1/2 (91)	4 (103)	5 (129)	6 (155)	
CONDUCTORS															
RHH, RHW, RHW-2	14	—	4	7	11	20	27	45	64	99	133	171	269	390	
	12	—	3	5	9	16	22	37	53	82	110	142	224	323	
	10	—	2	4	7	13	18	30	43	66	89	115	181	261	
	8	—	1	2	4	7	9	15	22	35	46	60	94	137	
	6	—	1	1	3	5	7	12	18	28	37	48	76	109	
	4	—	1	1	2	4	6	10	14	22	29	37	59	85	
	3	—	1	1	1	4	5	8	12	19	25	33	52	75	
	2	—	1	1	1	3	4	7	10	16	22	28	45	65	
	1	—	0	1	1	1	3	5	7	11	14	19	29	43	
	1/0	—	0	1	1	1	2	4	6	9	13	16	26	37	
	2/0	—	0	0	1	1	1	3	5	8	11	14	22	32	
	3/0	—	0	0	1	1	1	3	4	7	9	12	19	28	
	4/0	—	0	0	1	1	1	2	4	6	8	10	16	24	
	250	—	0	0	0	1	1	1	3	4	6	8	12	18	
	300	—	0	0	0	1	1	1	2	4	5	7	11	16	
	350	—	0	0	0	1	1	1	2	3	5	6	10	14	
	400	—	0	0	0	1	1	1	1	3	4	6	9	13	
	500	—	0	0	0	0	1	1	1	3	4	5	8	11	
	600	—	0	0	0	0	1	1	1	2	3	4	6	9	
	700	—	0	0	0	0	0	1	1	1	3	3	6	8	
	750	—	0	0	0	0	0	1	1	1	2	3	5	8	
	800	—	0	0	0	0	0	1	1	1	2	3	5	7	
	900	—	0	0	0	0	0	1	1	1	2	3	5	7	
	1000	—	0	0	0	0	0	1	1	1	1	3	4	6	
	1250	—	0	0	0	0	0	0	1	1	1	1	3	5	
	1500	—	0	0	0	0	0	0	1	1	1	1	3	4	
	1750	—	0	0	0	0	0	0	1	1	1	1	2	3	
	2000	—	0	0	0	0	0	0	0	1	1	1	2	3	
TW, THHW, THW, THW-2	14	—	8	14	24	42	57	94	135	209	280	361	568	822	
	12	—	6	11	18	32	44	72	103	160	215	277	436	631	
	10	—	4	8	13	24	32	54	77	119	160	206	325	470	
	8	—	2	4	7	13	18	30	43	66	89	115	181	261	
RHH*, RHW*, RHW-2*	14	—	5	9	16	28	38	63	90	139	186	240	378	546	
	12	—	4	8	13	22	30	50	72	112	150	193	304	439	
	10	—	3	6	10	17	24	39	56	87	117	150	237	343	
	8	—	1	3	6	10	14	23	33	52	70	90	142	205	
TW, THW, THHW, THW-2, RHH*, RHW*, RHW-2*	6	—	1	2	4	8	11	18	26	40	53	69	109	157	
	4	—	1	1	3	6	8	13	19	30	40	51	81	117	
	3	—	1	1	3	5	7	11	16	25	34	44	69	100	
	2	—	1	1	2	4	6	10	14	22	29	37	59	85	
	1	—	0	1	1	3	4	7	10	15	20	26	41	60	
	1/0	—	0	1	1	2	3	6	8	13	17	22	35	51	
	2/0	—	0	1	1	1	3	5	7	11	15	19	30	43	
	3/0	—	0	1	1	1	2	4	6	9	12	16	25	36	
	4/0	—	0	0	1	1	1	3	5	8	10	13	21	30	
	250	—	0	0	1	1	1	3	4	6	8	11	17	25	
	300	—	0	0	1	1	1	2	3	5	7	9	15	21	
	350	—	0	0	0	1	1	1	3	5	6	8	13	19	
	400	—	0	0	0	1	1	1	3	4	6	7	12	17	
	500	—	0	0	0	1	1	1	2	3	5	6	10	14	
	600	—	0	0	0	0	1	1	1	3	4	5	8	11	
	700	—	0	0	0	0	1	1	1	2	3	4	7	10	
	750	—	0	0	0	0	1	1	1	2	3	4	6	10	
	800	—	0	0	0	0	1	1	1	2	3	4	6	9	
	900	—	0	0	0	0	0	1	1	1	3	3	6	8	
	1000	—	0	0	0	0	0	1	1	1	2	3	5	7	
	1250	—	0	0	0	0	0	1	1	1	1	2	4	6	
	1500	—	0	0	0	0	0	1	1	1	1	1	3	5	
	1750	—	0	0	0	0	0	0	1	1	1	1	3	4	
	2000	—	0	0	0	0	0	0	1	1	1	1	3	4	

(Continues)

Table C.10 Continued

Type	Conductor Size (AWG/ kcmil)	Trade Size (Metric Designator)												
		$\frac{3}{16}$ (12)	$\frac{1}{2}$ (16)	$\frac{3}{4}$ (21)	1 (27)	1 $\frac{1}{4}$ (35)	1 $\frac{1}{2}$ (41)	2 (53)	2 $\frac{1}{2}$ (63)	3 (78)	3 $\frac{1}{2}$ (91)	4 (103)	5 (129)	6 (155)
THHN, THWN, THWN-2	14	—	11	21	34	60	82	135	193	299	401	517	815	1178
	12	—	8	15	25	43	59	99	141	218	293	377	594	859
	10	—	5	9	15	27	37	62	89	137	184	238	374	541
	8	—	3	5	9	16	21	36	51	79	106	137	216	312
	6	—	1	4	6	11	15	26	37	57	77	99	156	225
	4	—	1	2	4	7	9	16	22	35	47	61	96	138
	3	—	1	1	3	6	8	13	19	30	40	51	81	117
	2	—	1	1	3	5	7	11	16	25	33	43	68	98
	1	—	1	1	1	3	5	8	12	18	25	32	50	73
	1/0	—	1	1	1	3	4	7	10	15	21	27	42	61
	2/0	—	0	1	1	2	3	6	8	13	17	22	35	51
	3/0	—	0	1	1	1	3	5	7	11	14	18	29	42
	4/0	—	0	1	1	1	2	4	6	9	12	15	24	35
	250	—	0	0	1	1	1	3	4	7	10	12	20	28
	300	—	0	0	1	1	1	3	4	6	8	11	17	24
	350	—	0	0	1	1	1	2	3	5	7	9	15	21
	400	—	0	0	0	1	1	1	3	5	6	8	13	19
	500	—	0	0	0	1	1	1	2	4	5	7	11	16
	600	—	0	0	0	1	1	1	1	3	4	5	9	13
	700	—	0	0	0	0	1	1	1	3	4	5	8	11
	750	—	0	0	0	0	1	1	1	2	3	4	7	11
	800	—	0	0	0	0	1	1	1	2	3	4	7	10
	900	—	0	0	0	0	1	1	1	2	3	4	6	9
	1000	—	0	0	0	0	0	1	1	1	3	3	6	8
FEP, FEPB, PFA, PFAH, TFE	14	—	11	20	33	58	79	131	188	290	389	502	790	1142
	12	—	8	15	24	42	58	96	137	212	284	366	577	834
	10	—	6	10	17	30	41	69	98	152	204	263	414	598
	8	—	3	6	10	17	24	39	56	87	117	150	237	343
	6	—	2	4	7	12	17	28	40	62	83	107	169	244
	4	—	1	3	5	8	12	19	28	43	58	75	118	170
	3	—	1	2	4	7	10	16	23	36	48	62	98	142
	2	—	1	1	3	6	8	13	19	30	40	51	81	117
PFA, PFAH, TFE	1	—	1	1	2	4	5	9	13	20	28	36	56	81
PFA, PFAH, TFE, Z	1/0	—	1	1	1	3	4	8	11	17	23	30	47	68
	2/0	—	0	1	1	3	4	6	9	14	19	24	39	56
	3/0	—	0	1	1	2	3	5	7	12	16	20	32	46
	4/0	—	0	1	1	1	2	4	6	9	13	16	26	38
Z	14	—	13	24	40	70	95	158	226	350	469	605	952	1376
	12	—	9	17	28	49	68	112	160	248	333	429	675	976
	10	—	6	10	17	30	41	69	98	152	204	263	414	598
	8	—	3	6	11	19	26	43	62	96	129	166	261	378
	6	—	2	4	7	13	18	30	43	67	90	116	184	265
	4	—	1	3	5	9	12	21	30	46	62	80	126	183
	3	—	1	2	4	6	9	15	22	34	45	58	92	133
	2	—	1	1	3	5	7	12	18	28	38	49	77	111
	1	—	1	1	2	4	6	10	14	23	30	39	62	90
	14	—	8	14	24	42	57	94	135	209	280	361	568	822
XHWW, ZW, XHWW-2, XHH	12	—	6	11	18	32	44	72	103	160	215	277	436	631
	10	—	4	8	13	24	32	54	77	119	160	206	325	470
	8	—	2	4	7	13	18	30	43	66	89	115	181	261
	6	—	1	3	5	10	13	22	32	49	66	85	134	193
	4	—	1	2	4	7	9	16	23	35	48	61	97	140
	3	—	1	1	3	6	8	13	19	30	40	52	82	118
	2	—	1	1	3	5	7	11	16	25	34	44	69	99
	1	—	1	1	1	3	5	8	12	19	25	32	51	74
XHWW, XHWW-2, XHH	1/0	—	1	1	1	3	4	7	10	16	21	27	43	62
	2/0	—	0	1	1	2	3	6	8	13	17	23	36	52
	3/0	—	0	1	1	1	3	5	7	11	14	19	30	43
	4/0	—	0	1	1	1	2	4	6	9	12	15	24	35
	250	—	0	0	1	1	1	3	5	7	10	13	20	29
	300	—	0	0	1	1	1	3	4	6	8	11	17	25
	350	—	0	0	1	1	1	2	3	5	7	9	15	22
	400	—	0	0	0	1	1	1	3	5	6	8	13	19

Table 310.15(B)(16) (formerly Table 310.16) Allowable Ampacities of Insulated Conductors Rated Up to and Including 2000 Volts, 60°C Through 90°C (140°F Through 194°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)*

Size AWG or kcmil	Temperature Rating of Conductor [See Table 310.104(A).]						Size AWG or kcmil
	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	
	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	
	COPPER			ALUMINUM OR COPPER-CLAD ALUMINUM			
18**	—	—	14	—	—	—	—
16**	—	—	18	—	—	—	—
14**	15	20	25	—	—	—	—
12**	20	25	30	15	20	25	12**
10**	30	35	40	25	30	35	10**
8	40	50	55	35	40	45	8
6	55	65	75	40	50	55	6
4	70	85	95	55	65	75	4
3	85	100	115	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	145	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	140	180	205	4/0
250	215	255	290	170	205	230	250
300	240	285	320	195	230	260	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	350	420	475	285	340	385	600
700	385	460	520	315	375	425	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	445	800
900	435	520	585	355	425	480	900
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	525	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	555	665	750	470	560	630	2000

*Refer to 310.15(B)(2) for the ampacity correction factors where the ambient temperature is other than 30°C (86°F).

**Refer to 240.4(D) for conductor overcurrent protection limitations.

Note: According to NEC 240.4(D), the maximum overcurrent protection device rating for copper conductors are:

AWG 16 = 10 Amperes

AWG 14 = 15 Amperes

AWG 12 = 20 Amperes

AWG 10 = 30 Amperes