centerline of such bends shall not be less than shown in Table 2, Chapter 9.

Pulling conductors in underground conduit can damage nonmetallic elbows. Metal elbows are often used to ensure the raceway's integrity. Metal elbows in runs of PVC conduit that are buried at least 18 inches are not required to be bonded to the system grounded conductor or the grounding electrode conductor (GEC).

See also

250.80, Exception, for more information on metal elbows in service raceways and enclosures

Chapter 9, Table 2, for common raceway field bend measurements

N **(B) Number in One Run.** The total degrees of bends in a conduit run shall not exceed 360 degrees between pull points.

The number of bends in a conduit run is limited, to reduce pulling tension on the conductors and to help ensure easy insertion or removal of conductors during later phases of construction, when the conduit may be permanently enclosed by the building finish. The *NEC*® does not limit the pull points to conduit bodies and boxes, which are only examples of pull points.

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(B). Conduit listed for support at spacings other than as shown in Table 352.30(B) 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(B) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.

TABLE 352.30(B) *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

Δ **352.44 Expansion Fittings.**

N **(A) Thermal Expansion and Contraction.** 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(A), 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.

Because PVC conduit exhibits a considerable change in length during a change in temperature, expansion fittings are required for specific temperature variations. According to Table 352.44(A), a 100-foot run of PVC conduit will change 4.06 inches in length if the temperature change is 100°F.

The allowable range of expansion for many PVC conduit expansion couplings is generally 6 inches. Information concerning installation and application of this type of coupling can be obtained from manufacturers' instructions.

Expansion fittings are seldom used underground, where temperatures are relatively constant. If PVC conduit is buried or covered immediately, expansion and contraction are not considered a problem.

See also

300.7(B) and its commentary regarding the expansion of PVC

N **(B) Earth Movement.** Expansion fittings for underground runs of direct buried PVC conduit emerging from the ground shall be provided above grade when required to compensate for earth settling or movement, including frost heave.

Informational Note: See 300.5(J).

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.

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

Exception No. 1: The equipment grounding conductor shall be permitted to be run separately from the circuit conductors as permitted in 250.134, Exception No. 2, for dc circuits and