



Canadian Standards Association
Mississauga, Ontario
To the Part I Committee

Subject No. 2914

Chair: M.D. Gardener

Date: April 1, 2003

Title: Radii of Bends in Raceways, Rule 12-922(1) and Table 7

Submitted by: C.W. Beile of Allied Tube & Conduit, 215 Prairie Ave., Wheaton, Illinois, 60187, Tel:(708) 339-1610, Fax: (708) 653-5328 on March 29, 2000.

Proposal:

(A) Amend Rule 12-922(1) as follows:

(1) Where raceways of the type into which conductors are drawn are bent during installation, the radius of the curve to the centreline of the bend shall not be less than shown in Table 7, page 441, the radius of the curve of the inner edge of the bends shall be at least 6 times the internal diameter of the raceway except that the radius shall be increased to 10 times where lead sheathed cable is used.

(B) Add the following Table 7 to page 441 of the CEC.

Table 7
Radius of Conduit Bends

Trade Size of Conduit (Metric Designator)		Minimum Radius to Centre of Conduit
1/2	(16)	101.60
3/4	(21)	114.30
1	(27)	146.05
1 1/4	(35)	184.15
1 1/2	(41)	209.55
2	(53)	241.30
2 1/2	(63)	266.70
3	(78)	330.20
3 1/2	(91)	381.00
4	(103)	406.40
5	(129)	609.60
6	(155)	762.00

Reasons for Request: The 6 times I.D Rule may allow a smaller bend that may cause wire pulling problems.

Supporting Information: A study by Electrical Industry conduit manufacturers found that the manufacturers of conduit benders made the shoes of both hand and power benders with measurements to the center line of the conduit as shown in the proposed Table 7.

Chair's Comments: After a discussion with the submitter, the proposal was revised to:

- 1) Amend Rule 12-922(1) as follows:

12-922(1) Whereas raceways of the type into which conductors are drawn are bent during installation, the radius of the curve to the centreline of the bend shall not be less than shown in Table 7.

- 2) Amend Rule 12-1412(2) as follows:

12-1412(2) The minimum bending radius shall comply with Rule 12-922.

- 3) Delete Rule 12-1412(3)

- 4) Amend Rule 12-1514(2) as follows:

12-1514(2) The minimum bending radius shall comply with Rule 12-922.

- 5) Add “mm” to the heading in Column 2 of Table 7.

- 6) Round off to the nearest whole number in Column 2.

ie. 102, 114, 146, 184, 210, 241, 267, 330, 381, 406, 610, 762

- 7) Table 7 could be located on Page 441.

Reason for Request:

1. The 6 times internal diameter rule may allow a smaller bend that may cause wire pulling problems.
2. Lead covered cables are rarely used and I cannot remember the last time I saw them pulled into E.M.T.

Supporting Information: The same as stated in the original proposal.

I'm in support of the revised proposal. Table 7 will coincide with:

Table 4 - C22.2 No. 45-M1981, Rigid Metal Conduit

Table 3 - C22.2 No. 83-M1986, E.M.T.

Table 4 - C22.2 No. 211.2-M1984, Rigid P.V.C.

Table 346-10 Exception, Radius of Conduit Bends of the National Electrical Code.

Subcommittee Deliberation: There were ten replies, all in favour of the proposal. There were no comments or negative replies.

Subcommittee Recommendation: Accept the revised proposal.

Chair's Comments (Second Round): At the 106th Canadian Electrical Code, Part I meeting, the Section 12 Subcommittee recommendation to accept the revised proposal was defeated and consequently sent back to the Subcommittee for further work.

The concern of the Part I Committee was that the proposal was directed at raceways that used mechanical devices (conduit benders) to bend conduit/tubing on installations. The benders are manufactured with bends that are consistent with the proposed Table 7.

Table 7 is comparable to the tables for radii of bends in the Part II standards for:

1. C22.2 No. 45-M1981, Rigid Metal Conduit, Table 4
2. C22.2 No. 83-M1985, Electrical Metallic Tubing, Table 3
3. C22.2 No. 211.3-M1985 Rigid P.V.C, Table 4 (see attached).

However raceways also include flexible type conduit/tubing (note definition of raceway). Would these types of raceways also have to conform to Table 7?

The intent is to be able to draw in or pull conductors through the bends of raceways without causing damage to the conductors. Since it is also possible to pull or draw in conductors in flexible raceways then the flexible raceway should also comply to Table 7.

With some discussion with the submittor, the following revised proposal is submitted.

1. Amend Rule 12-922(1) as:

- (1) Where conductors are drawn into a raceway, the radius of the curve to the centre line of any bend shall be not less than as shown in Table 7

Note: The reference to lead sheath cable is eliminated since this product is no longer manufactured.

This rule is now generic to all raceways that conductors are pulled into.

2. Delete Rule 12-1412 - This rule is now covered in Rule 12-922.
3. Delete Rule 12-1514 - This rule is now covered in Rule 12-922.
4. Add "mm" to the heading in Column 2 of Table 7.
5. Round off to the nearest whole number in Column 2 of Table 7. – i.e. 102, 114, 146, 184, 210, 241, 267, 330, 381, 406, 610, 762
6. Table 7 could be located on Page 286 of the CEC 19th edition.

Subcommittee Deliberations: There were nine responses on the second round and all members agreed with the revised proposal.

Subcommittee Recommendation: To accept the revised proposal.