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1. Cable bending radii

To comply with Regulation 522.8.3 of *BS 7671*, a cable must not be bent to a radius smaller than a given value, based on its overall diameter. To do so may cause damage to the conductors and insulation, or to the sheath, armouring or serving (if any) of the cable during erection of the installation or at some other time, such as under fault conditions.

Table 1 gives the recommended minimum bending radii for various common types of cable. The radii quoted are in accordance with British Standards or, where no such information is given in the British Standard for the cable concerned, represent accepted practice. The minimum radius dimension given in Table 1 relates to the surface of the cable on the inside of the bend (see Fig 1) and is given in terms of the overall diameter of the cable.

Diagram showing how the minimum recommended bending radii of Table 1 relate to the surface of the cable on the inside of the bend.

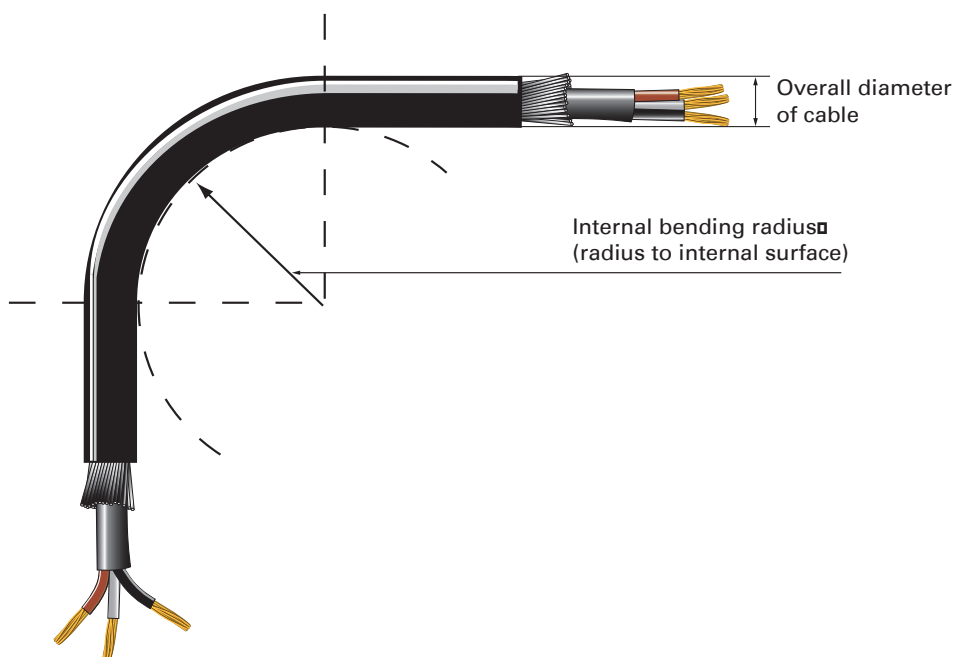


Fig 1

Table 1 Minimum internal bending radii for common types of cable

Cable type	Conductor material and construction	Cable overall diameter ^a	Factor to be applied to overall diameter of cable to determine minimum internal radius of bend	
			Single-strand conductor (solid)	Multi-strand conductor
Non-armoured				
Thermoplastic (pvc) or thermosetting (XLPE or rubber).	Copper and aluminium circular and circular stranded conductors.	Not exceeding 10 mm	3	2 ^b
		Exceeding 10 mm but not exceeding 25 mm	4	3 ^b
		Exceeding 25 mm	6	6
	Copper shaped conductors and solid aluminium conductors.	All	8	8
Armoured				
Thermoplastic (pvc) or thermosetting (XLPE or rubber).	Copper and aluminium circular and circular stranded conductors.	All	6	
	Copper shaped conductors and solid aluminium conductors.	All	8	
Mineral insulated copper sheathed (MICS)				
Bare or with overall covering	Copper	All	6 ^c	

a For flat type cables the diameter refers to the major axis.

b For single core circular conductors (unsheathed) installed in conduit, ducting or trunking.

c For MICS cables the minimum internal bending radius should normally be limited to six times the diameter of the bare copper sheath, as this will allow further straightening and reworking if necessary. However, a cable may be bent to a minimum internal bending radius of three times the diameter of the bare copper sheath, provided the bend is not re-worked.

As an example of the use of Table 1, consider an armoured thermosetting insulated cable having copper circular conductors and an overall diameter of 32 mm. From Table 1, it can be seen that the recommended minimum internal bending radius for the cable is six times its overall diameter (i.e. $6 \times 32 \text{ mm} = 192 \text{ mm}$). Had the conductors of the cable been of the copper **shaped** type, rather than the copper **circular** type, the minimum recommended internal bending radius according to Table 1 would have been eight times the overall diameter of the cable.

For a flat type cable, such as a thermoplastic insulated and sheathed 'twin and earth' cable to BS 6004, the minimum internal bending radius is based on the major axis of the cable (see Fig 2), rather than on the overall diameter – note 'a' beneath Table 1 refers.

Bending cables to the recommended minimum bending radii in Table 1 should be regarded as the exception rather than the rule. The bending radius should be the greatest that circumstances will permit.

Cross-section through a flat type cable, indicating the major axis

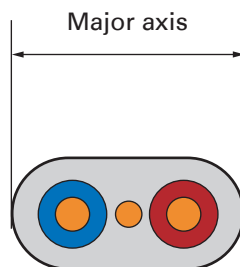


Fig 2

2. Cold weather precautions

A cable should not be bent when at such a low temperature that damage might be caused to its insulation, sheath or serving, if any. British Standards for cables recommend that for a cable having a standard thermoplastic (pvc) sheath, installation (including bending) should take place only when both cable and ambient temperature are above 0 °C and have been so for the previous 24 hours, or when special precautions have been taken to maintain the cable at above this temperature.

3. Bends in wiring systems

The radius of every bend in a conduit, trunking, ducting or other wiring system must be such that the bending radii of the cables in the wiring system will not be less than the recommended minimum given in Table 1 of this topic.

4. Precautions during installation

When a cable is being installed, for example, being removed from a cable drum or being pulled in to a conduit, trunking or duct, it is important that the cable is not bent to a radius less than that recommended in item 3.

5. Tighter bending radius

If a tighter bending radius is needed for a cable than that given in item 3 (for example, due to the restricted cable route dimensions through a building or ducting system) it will be necessary to select an alternative cable installation arrangement. For example, instead of installing one large cable install two smaller cables in parallel.

**Topics referred to in this text:**

None

**Topics not referred to in this text, which are related and may be of interest:**

None listed

***BS 7671* (Requirements for electrical installations)**

Some of the most important requirements are found in:

Other mechanical stresses (AJ)

Regulation 522.8