Cable Support Distances

Although BS 7671 touches on the subject of cable supports, it does not detail specifically what these support distances should be. **Section 522.8** (Other Mechanical Stresses (AJ)) in that document provides requirements for cable support.

Clause 522-08-04 Where conductors or cables are not supported continuously due to the method of installation, they shall be supported by suitable means at appropriate intervals in such a manner that the conductors or cables do not suffer damage by their own weight.

Clause 522-08-05 Every cable or conductor shall be supported in such a way that it is not exposed to undue mechanical strain and so that there is no appreciable strain on the terminations of the conductors, account being taken of mechanical strain imposed by the supported weight of the cable or conductor itself.

All cables should therefore be suitably supported. When the cable is installed 'clipped direct to a surface', then the clipping distance should be in line with the **IET Selection and Erection Guidance Notes number 1**. This provides distances for cables based on their diameter and cable type. Prysmian Group was instrumental in providing this information and an extract is provided in this document.

It should be noted that all cable types regardless of whether they are fire resistant or not, must use fire resistant cable supports that ensure the cable system is not liable to premature failure. This means all cable supports must be manufactured from a material that will not fail in a fire. **Clause 521.10.202** in BS 7671 elaborates further.

Clause 521.10.202 Wiring systems shall be supported such that they will not be liable to premature collapse in the event of a fire.

Note 1: Wiring systems hanging across access or egress routes may hinder evacuation and firefighting activities.

Note 2: Cables installed in or on steel cable containment systems are deemed to meet the requirements of this regulation.

Note 3: This regulation precludes, for example, the use of non-metallic cable clips or cable ties as the sole means of support where cables are clipped direct to exposed surfaces or suspended under cable tray, and the use of non-metallic cable trunking as the sole means of support of the cables therein.

Note 4: Suitably spaced steel or copper clips, saddles or ties are examples that will meet the requirements of this regulation. 522

The spacing stated for horizontal runs may be applied also to runs at an angle of more than 30 Degrees from the vertical. For runs at an angle of 30 Degrees or less from the vertical, the vertical spacing is applicable.

Note: At the point of change from vertical to horizontal and horizontal to vertical the internal radius of bend should not be less than the minimum bending radius for the cable. Cable supports should be applied at either side of the bend.

Where long vertical runs are used (e.g. in excess of 32 metres), strain relief sections shall be incorporated. There are various ways of including strain relief sections, but the preferred method is to offset the cable by at least 2 cable diameters for each strain relief section. In practise this means that only ONE fixing is offset from the main vertical run.

E.g.: 1 = 0, 2 = 2, 3 = 0

Note: Cleat 3 must not exceed 32m on vertical run
Note: Offset should be applied symmetrically

For excessive vertical runs (exceeding 100m) then additional measures should be applied. The cable should not be allowed to have a straight vertical run without the addition of a tension relieving section. This normally involves the cable having a short horizontal section (at least 1 metre) included in the vertical run.

Spacings of supports for cables in accessible positions

Maximum spacings of cable fixings								
Overall diameter of cable*	Non-armoured thermosetting, thermoplastic or lead sheathed cables and non-armoured fire resisting cables.				Single wire armoured cables, including fire resistant armoured cables		Mineral insulated copper or aluminium sheathed cables	
	Generally		In caravans					
	Horizontal† 2	Vertical† 3	Horizontal† 4	Vertical† 5	Horizontal† 6	Vertical† 7	Horizontal† 8	Vertical† 9
mm	mm	mm	mm	mm	mm	mm	mm	mm
Not exceeding 9	250	400	250	400	-	-	600	800
Exceeding 9 and not exceeding 15	300	400	250	400	350	450	900	1200
Exceeding 15 and not exceeding 20	350	450	250	400	400	550	1500	2000
Exceeding 20 and not exceeding 40	400	550	250	400	450	600	-	-
Exceeding 40 and not exceeding 50	600	800	-	-	900	1100	-	-
Exceeding 50 and not exceeding 60	750	1000	-	-	950	1100	-	-
Exceeding 60 and not exceeding 70	900	1200	-	-	1000	1200	-	-
Exceeding 70 and above	1000	1400	-	-	1200	1400	-	-

Note: Fire resistant fixings should be used for fire resistant cables.

* For flat cables taken as the dimension of the major axis.
The spacings shown above apply to multi-core cables.
The spacing of fixings on single core cables in a.c. installations must take account of the magnituse of forces generated under fault conditions.

† The spacings stated for horizontal runs may be applied also to runs at an angle of more than 30 from the vertical.
For runs at an angle of 30° or less from the vertical, the vertical spacings are applicable.

For flexible systems, where the cable is not directly fixed to the support system, for example a J hanger installation, calculations need to be undertaken to determine the required distance between the cable support positions to achieve a set deflection/off-set. It is not realistic to install cables in a flexible system without any initial off-set (typically 2%). If no offset is introduced, in the form of a deflection from the cable plane (either in the vertical or horizontal plane) then expansion will build up at discrete points as the cable heats up and the conductor expands. This could cause the cable to become displaced from its hanger supports.

Prysmian UK use the Heinhold method for undertaking such calculations for major projects. This method considers the stiffness of the cable by summating the axial moment of inertia (Jo) of each element with the Emodulus for each material layer (e.g. insulation, armour, and sheath). From this figure the length between support positions can be calculated for the defined deflection (sag) percentage. The length between support positions will change depending on the cable design, size, materials and weight. For example, an MDPE sheathed cable will be stiffer and therefore require a greater distance between support positions than for a LSOH cable of a similar design, to achieve the same 2% deflection (sag).