

EXTERNAL SERVICE DUCTS AND CABLE TROUGHING

SECTION 190

Service ducts routes generally

DUCTS

Except where shown otherwise on the Contract Drawings, the number, type and size of ducts shall be determined by the Contractor.

Ducts shall have a smooth internal bore, and shall be free from sharp edges at duct ends.

Ducts shall be a size and type suitable for the cables to be installed without damage. The minimum internal diameter of the duct as applicable to cable type shall be 1.5 times the diameter of the cable or group of cables subject to the minimum duct diameters in Table 190/1.

Table 190/1		
Cable usage designation	Cable type	Minimum duct diameter
A B	High voltage distribution Direct current (d.c.) traction	150 mm
C D E	Signalling Telecommunication Low voltage distribution	100 mm

Except where otherwise specified on the Contract Drawings, the number of ducts to be provided shall include spare ducts as detailed in Table 190/2.

Table 190/2			
Number of ducts required	≤ 3	4 - 10	≥ 11
Number of spare ducts to be provided	1	2	3

Only one type of duct shall be used between consecutive cable draw pits.

Where cable routes are required to cross railway tracks, the cables shall be taken through an undertrack crossing in accordance with Clause 190.006, except when:

- (i) crossing terminal sidings in which case the requirements of Section 191: Cable Troughing shall apply,
- (ii) an existing or proposed signalling gantry is available to which the cable can be clipped into position, and the gantry has been designed to accommodate such cables.

Where cable routes are required to cross a public road or an access road carrying regular vehicular traffic, the cables shall be taken through a duct crossing in accordance with Clause 190.012.

Excavation and backfilling for service ducts and buried direct cable routes shall be in accordance with Section 51: Excavations, unless qualified or amended by this Section of the Specification.

(190.001)

Location of ducts generally

- 2** Cable ducts shall be located a minimum 150 mm away from gas and water pipes, drains, sewers and electrical Contractor's Equipment. Where services cross, the clearance shall be not less than 50 mm.

Deflection from a straight line or variation in depth shall not exceed 1 in 30 horizontally nor 1 in 60 vertically.

(190.002)

Materials for ducts

- 3** Ducts materials shall be in accordance with Table 190/3 applicable to the cable usage designation specified in Table 190/1.

Table 190/3					
	A	B	C	D	E
Vitrified clay ducts normal to BS 65	ü	ü	ü	ü	ü
Unplasticised polyvinyl-chloride to BS 4660 or BS 3506, classes B, C, D or E	ü	ü	ü	ü	ü
High density polyethylene	ü	ü	ü	ü	ü
Steel to BS 1387			ü	ü	ü
Iron to BS EN 545, BS EN 598, or BS EN 969			ü	ü	ü
Heavy duty rigid polyvinyl-chloride reinforced tube	ü	ü	ü	ü	
Lubricated ducts				ü	

(190.003)

Jointing ducts

- 4** Ducts shall be jointed appropriate to duct material as follows:
- (i) vitrified clay ducts shall be jointed with a flexible jointing system equivalent to BS 494, type D,
 - (ii) unplasticised polyvinyl-chloride (UPVC) ducts shall be jointed using integral sockets sealed with a flexible sealing system in accordance with BS 4346: Part 2, or welded with a solvent cement in accordance with BS 4346: Part 3,
 - (iii) steel tubes shall have screwed socket joints and end bushes.

Where practicable heavy duty rigid polyvinyl reinforced tube, and high density polyethylene ducts shall be used without joints. Any joint system proposed to be used shall be agreed by the Employer's Representative prior to incorporation in the Works.

(190.004)

**High density
polyethylene ducts**

- 5** High density polyethylene ducts shall be black twin walled ducts with corrugated outer sleeve in accordance with the Electricity Supply Industry Specification No. 1224, "Plastic ducts for buried electric cables" which is available from:

Electricity Association,
30 Millbank,
London SW1P 4RO.

Telephone: 0171 963 5700

(190.005)

**Duct undertrack
crossings**

- 6** Wherever practicable, undertrack crossings shall be constructed perpendicular to the line of the rails. No point of an undertrack crossing shall be less than 3.0 metres from the nearest a.c. electrification overhead line equipment mast.

Undertrack crossings shall be provided with cable draw pits in accordance with Clause 190.013, where an undertrack crossing causes a 'T' junction with the cress troughing route.

Where no cable draw pits are provided to an undertrack crossing, the route of the undertrack crossing shall follow the principles in Standard Drawing No. SR/A3/13961.

Where practicable, an undertrack crossing shall be constructed with additional capacity to facilitate cable renewal without the need for construction of another undertrack crossing.

Where the dimension between the underside of the sleeper and the top of the ducts in an undertrack crossings is less than 900 mm, a concrete surround, minimum 150 mm thick, shall be provided.

Ducts laid in groups shall have a minimum 75 mm of concrete between adjacent ducts.

Concrete surrounds shall extend the full width of the trench and between manholes or for a distance of 1.0 metre beyond the outermost rail as applicable.

Concrete to form the surround shall be minimum grade ST5 to BS 5328: Part 2 in accordance with Section 85: Concrete for Ancillary Purposes, and shall include cement to BS 4027.

Pipes, sleeves, ducts and the concrete surround to form an undertrack crossing shall be able to resist the Permanent loads and type RU loading acting at the underside of the sleepers as defined in BS 5400: Part 2.

The depth of the top of the pipe, or upper surface of any concrete surround to any duct or group of ducts shall be not more than 1100 mm below lowest rail level, when constructed by open cut, or less than 2000 mm otherwise.

Backfilling above the pipe, duct or concrete surround and up to the level of the formation shall consist of well compacted ballast in accordance with Railtrack Line Standard RT/CE/S006, placed in layers maximum 150 mm thick and thoroughly compacted.

(190.006)

**Construction of
undertrack
crossings**

- 7** The method of construction of undertrack crossings shall be selected to have minimal effect on structures and lineside apparatus and the alignment of the track. Temporary speed restrictions shall be imposed applicable to the limits for track geometrical irregularities specified in Railtrack Line Standard RT/CE/S104.

Rail levels shall be monitored during the progress of the construction of undertrack crossings and should the movement of the track cause the limits for track geometrical irregularities applicable to the line speed specified in RT/CE/S104 to be exceeded, an emergency speed restriction shall be imposed, and the Employer's Representative notified immediately.

The quantity of soil removed from pipe jacked undertrack crossings shall be monitored to ensure that the volume is compatible with the progress of the work.

The removal of any temporary track supports, or reinstatement of ballast shall not be undertaken until the concrete surround has attained the specified strength.

The reinstatement of geotextile separator, track ballast, and track shall be carried out using materials in accordance with Section 216: Permanent Way Materials, and in accordance with Section 217: Construction Standards for Permanent Way.

(190.007)

**Thrust and
reception pits**

- 8** Thrust and reception pits shall be located minimum 6.0 metres or 1.5 times the depth from rail level to the top of the undertrack crossing whichever is the greater, measured horizontally from the nearest rail to the edge of the excavation, or where the track is carried on an embankment from the edge of the excavation to the toe of the embankment.

(190.008)

Slab track

- 9** The design of concrete slab track shall include the provision of ducts or troughs cast within or below the slab for existing cable routes and for the following:

- (i) DC traction supply track feeder cables both positive and negative, which are required to maintain the continuity of conductor rails and track feeder returns,
- (ii) **(INSERT).**

Where an AWS magnet is to be located within the track slab zone, provision shall be included within the track slab for mounting the equipment and associated cabling.

(190.009)