Code of Practice

For

Internal Telecommunication Wiring

IDA CP L1
Issue 1, 2000

Info-Communications Development Authority of Singapore
Equipment and Cabling Regulation Department
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CONTENTS

1 INTRODUCTION

1.1 The Code of Practice for Internal Telecommunication Wiring (IDA CP L1: 2000) is published in conjunction with the Licensing Scheme for Telecommunication Wiring Contractors and Telecommunication Wiring Installers. It is an editorial revision of IDA CP L1: 2000 - Code of Practice for Telephone Wiring Installations in Residential & Business Premises and replaces the latter publication.

1.2 The Code of Practice defines the exemplary wiring workmanship and practices which the licensed telecommunication wiring contractors and installers are required to comply with. It supports the licensing scheme by ensuring good quality of performance of the telecommunication wiring and better aesthetics of the premises.

1.3 The Code of Practice is subject to revision from time to time to keep abreast of technical developments and technological advancement.

2 SCOPE

2.1 This Code of Practice defines the wiring workmanship and practices, which will help to ensure that telecommunication wiring and associated equipment perform to a satisfactory standard. Internal telecommunication wiring at the user premises shall be supplied and installed by licensed installers and contractors in accordance with this code and generally accepted principles of sound and safe practice.

2.2 Telecommunication cables and other wiring equipment to be used for telecommunication wiring work shall comply with the current specifications for telecommunication cables and ancillary accessories as set out in Annex I (IDA TS L1-1, L1-2, L2-1, L3-1, L3-2 and L3-3), and other associated specifications to be designated by IDA from time to time.

2.3 Although the provisions and information in this Code of Practice and the associated specifications often make references to telephone cables, cabling and wiring equipment, these provisions and information are also applicable to other telecommunication services which make use of the standard telephone cables and wiring equipment.

3 INTERFACE POINT AND CABLING PRACTICES

3.1 DEFINITIONS AND INTERFACE POINT

3.1.1 Internal Telecommunication Wiring

Internal (Telecommunication) Wiring means any telecommunication line, wire, cable, optical fibre, conduit or other physical medium connecting a user's telecommunication equipment and any Interface Point (IP) but does not include the use of extension cords with built-in connectors and sockets.

Users can use the services of licensed telecommunication wiring contractors or installers to install, maintain or repair the internal telecommunication wiring. User means a person who has subscribed to any telecommunication service of a public telecommunication network provider (or public telecommunication licensee).

3.1.2 Interface Point

The Interface Point (IP) is the point of interconnection between a user's telecommunication equipment and the telecommunication system of a telecommunication network provider.

The locations of the IP are divided into two categories. Generally, the IP is located either at the Doorstep or at the Distribution Point (DP).

i) **IP At Doorstep**

The types of premises under this category are HDB apartments, shophouses without Management Corporation, shophouses in HDB residential blocks, business and residential premises served by overhead telecommunication wiring (except site offices).

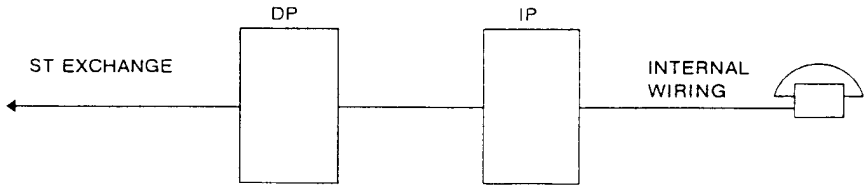

Fig.3-1 IP at Doorstep

ii) **IP At DP**

The types of premises under this category are shopping centres, office complexes, factories (terrace/flatted), HDB shopping/office complexes, markets, food/hawker centres, multiple buildings within a compound (campus layout), private houses (bungalows, semi-detached, terrace) and private and HDB apartments provided with concealed telecommunication wiring served directly from the DP in the riser duct.

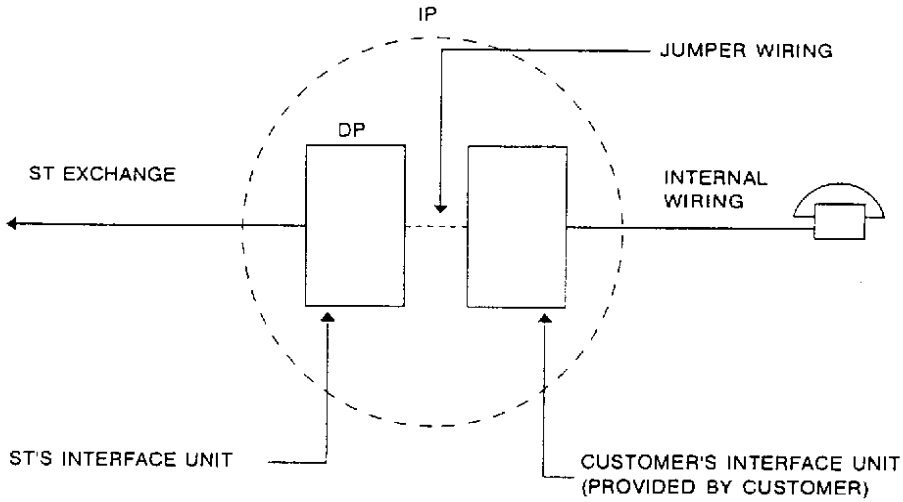

Fig.3-2 IP at DP

The location of the IP in various premises is further elaborated in the following sections.

3.2 RESIDENTIAL PREMISES

3.2.1 General

3.2.1.1 Individual HDB flat unit is pre-cabled with at least one telephone socket to the living room. Multi-compartment Poly-Vinyl Chloride (PVC) trunking and 20mm PVC casing are used from the IP to the socket.

3.2.1.2 Telephone lines serving private residential premises shall be provided according to the telephone wiring configurations as shown in appendix C. Developers or building owners shall provide and install telephone cables, Block Terminal (BT) and all materials from the IP to the residential unit.

3.2.2 HDB Flats

3.2.2.1 The IP between telecommunication licensee and the owner of a HDB unit shall be the BT located outside the unit. However, for older HDB flats where there is no BT outside the unit, the IP shall be at the doorstep.

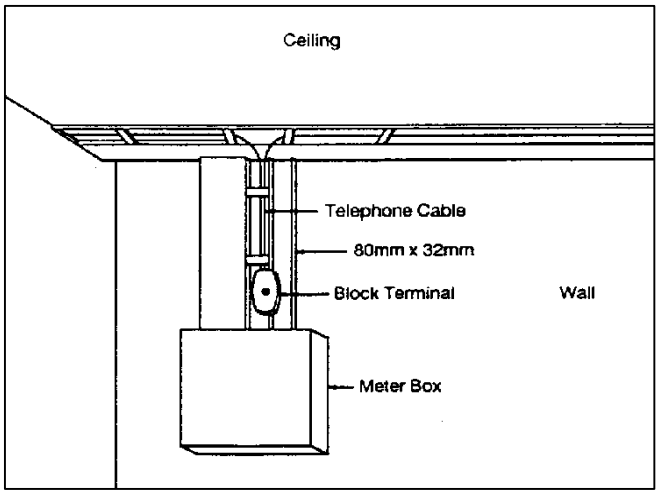

Fig.3-3 Location of Block Terminal

3.2.2.1 For new HDB flats using the riser duct concept, no BT is installed and the IP between the telecommunication licensee and the owner of a HDB unit shall be the DP located within the riser duct. Each DP located in the duct usually does not serve more than two units.

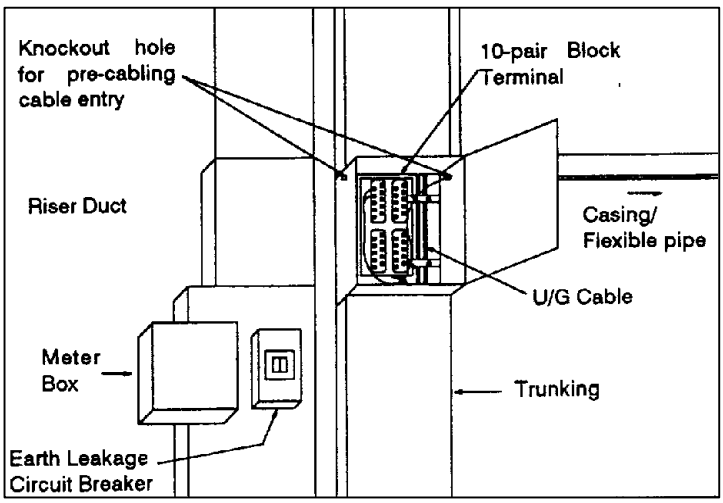

Fig.3-4 Location of DP in riser duct for HDB

3.2.3 Apartments/Condominiums

3.2.3.1 The IP between the telecommunication licensee and the owner of an Apartment/ Condominium shall be the DP located in the riser duct.

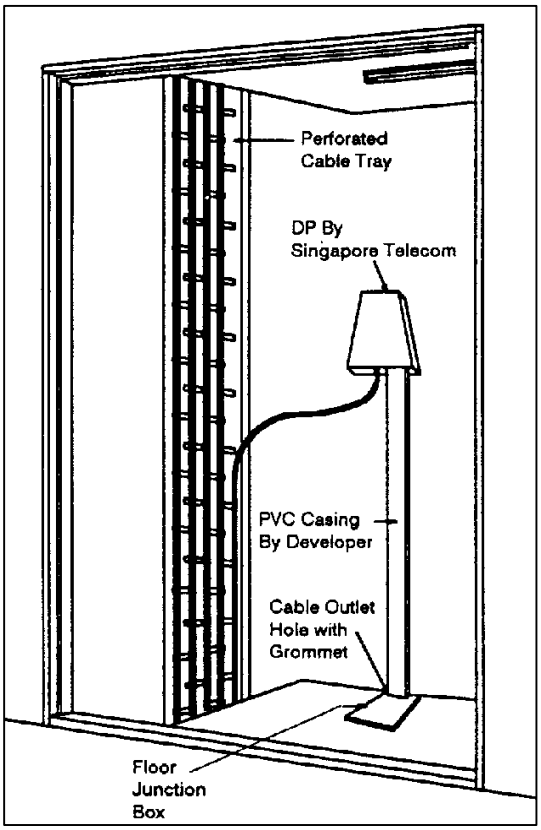

Fig.3-5 Location of DP in riser duct for Apartments/Condominiums

3.2.3.2 Developers or building owners shall provide and install the telephone cables, BTs and all materials from the DP to the residential unit.

3.2.3.3 For Shops/Offices/Kiosk located in Apartments/Condominiums, at least one number of 8-wire telephone cables shall be provided.

3.2.3.4 For Public payphone, the Paystation Department of Singapore Telecom shall be consulted on the provision of cables and facilities.

3.2.4 Private Houses

3.2.4.1 The IP between the telecommunication licensee and the owner of a Bungalow/ Detached/Semi-detached/Terrace House shall be the DP which can be located at the gate pillar, car porch or store room.

3.2.4.2 Developers or building owners shall provide and install the telephone cables, BTs and all materials from the DP to the residential unit.

3.2.4.3 For Private Houses where the DP is located at the gate pillar, a 5-pair, 0.5mm polyethylene cable shall be provided by the developer from the DP at the gate pillar to a BT inside the house.

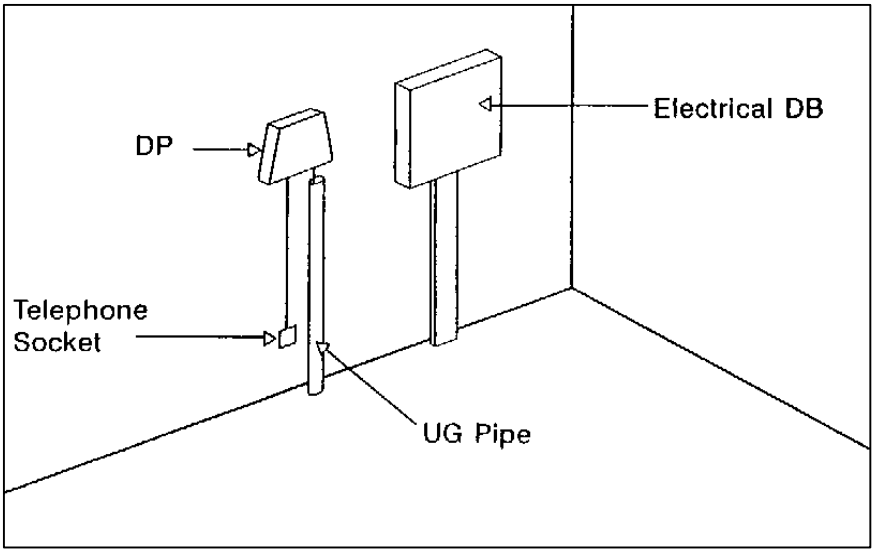

Fig.3-6 Typical location of DP at store Room & car porch

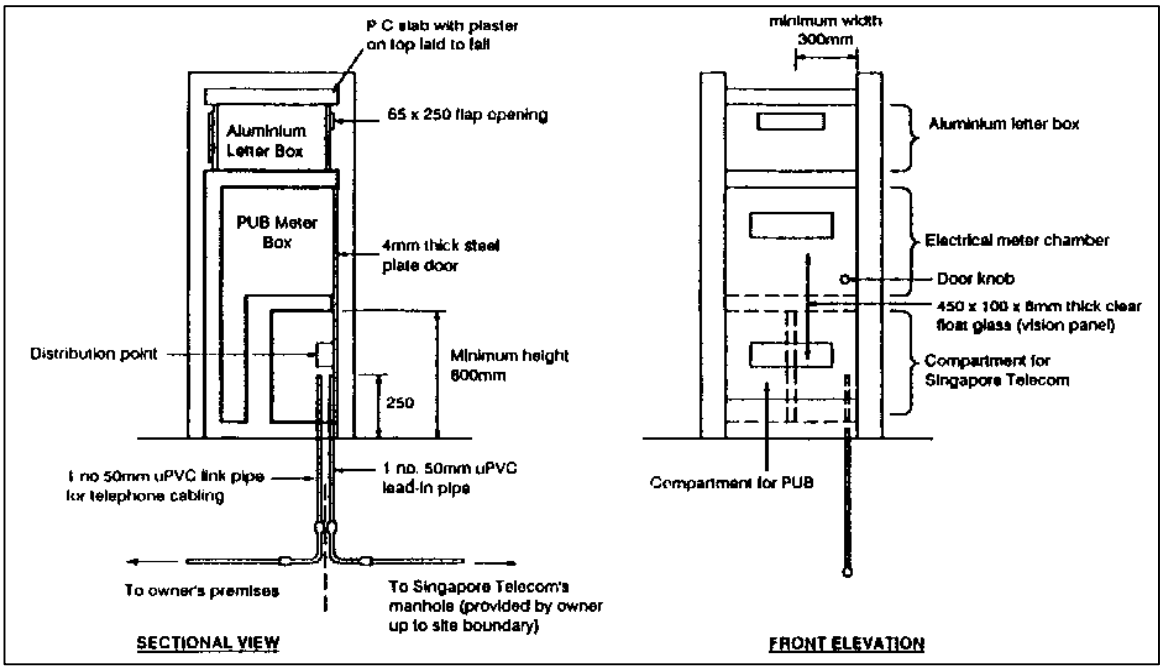

Fig.3-7 Typical location of DP at gate pillar

3.3 BUSINESS PREMISES

3.3.1 General

3.3.1.1 In order to ensure that buildings possess a strong local cabling infrastructure, extra provision must be made for expansion. For this reason, multi-core cables should be used from the DP to the shops/offices or else there will be a disarray of wires running through the buildings.

3.3.1.2 The BTs/Local Boxes should be located in an easily accessible position for convenience of future installation and maintenance works.

3.3.2 Shophouses without Management Corporations

3.3.2.1 For shophouses without Management Corporations, the cabling responsibility of Singapore Telecom ceases at the doorstep. A BT shall be erected for every unit. This point is designated as the IP.

3.3.2.2 Tenants shall provide the cabling between the IP and the telephone sockets/equipment.

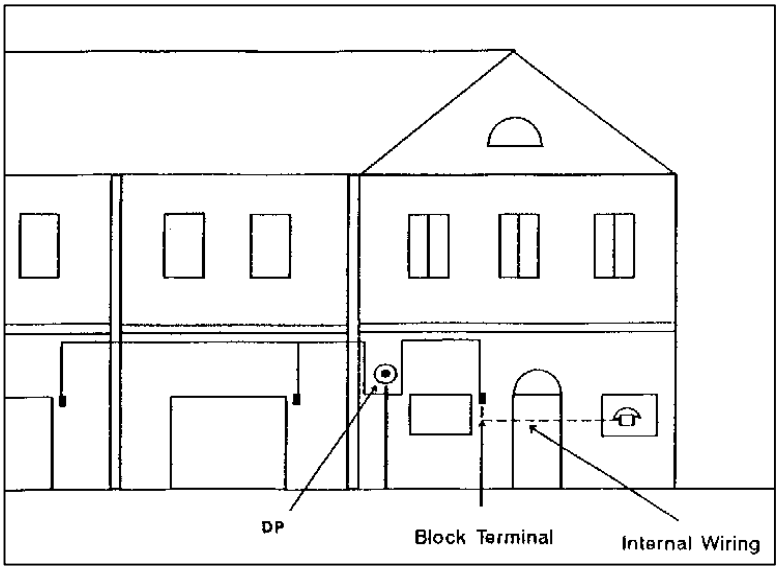

Fig.3-8 Shophouses without Management Corporations

3.3.3 Shopping Centres

3.3.3.1 The IP for shopping centres is designated at the DP.

3.3.3.2 Building owners shall ensure that telephone cables are properly concealed. Building owners are advised to pre-cable their building from the IP to all the shop units. For shop unit tenants of some special trades that require extra lines, such as moneychangers or tour agencies, extra accommodation should be made.

3.3.3.3 Intermediate Distribution Frame (IDF) verticals should be erected at the telephone risers to ensure adequate space for termination of the cables.

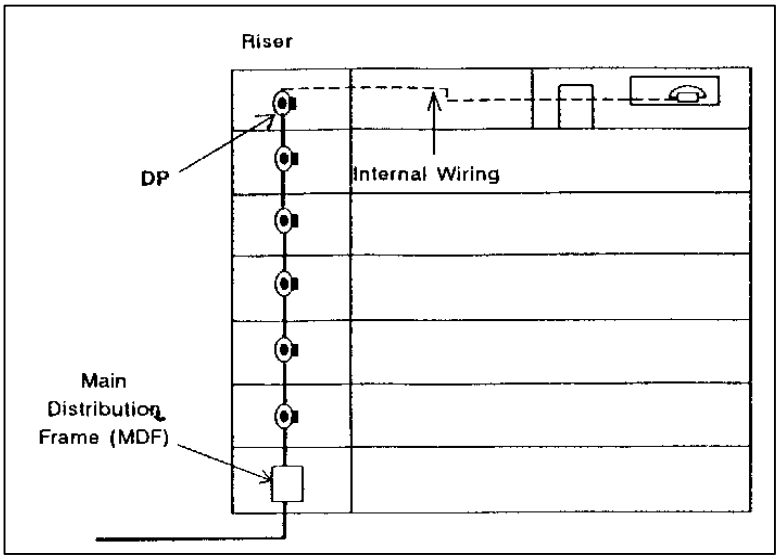

Fig.3-9 Shopping Centres

3.3.4 Office Complexes/Units

3.3.4.1 The IP for office complexes is designated at the DP.

3.3.4.2 Building owners shall ensure that the telephone cables are properly concealed in the telephone distribution systems.

3.3.4.3 Building owners/customers shall run multi-core cable between the IP and BTs to all office units. This will reduce the need to run many individual telephone wires and hence enhance the aesthetic of the buildings.

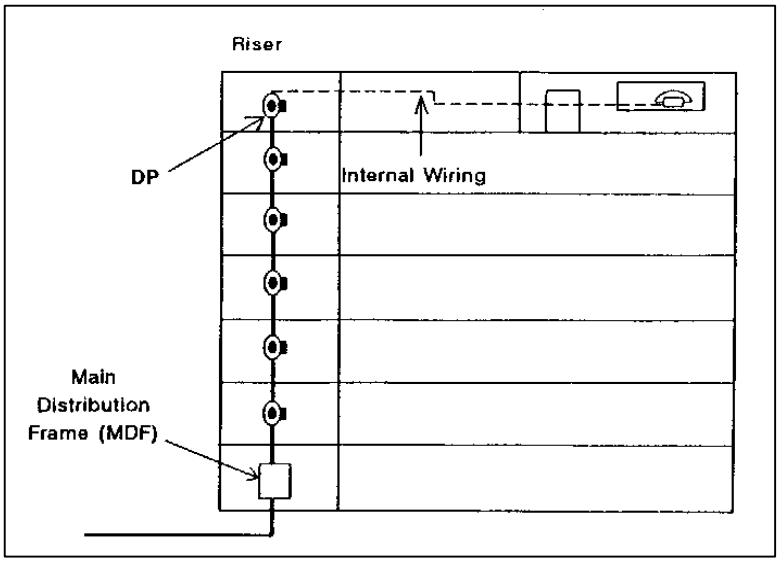

Fig.3-10 Office Complexes/Units

3.3.5 Market/Food/Hawker Centres

3.3.5.1 The IP is designated at the DP.

3.3.5.2 The cabling responsibility of the customers shall be from the IP to their stalls under the supervision of building owners. Alternatively, building owners can pre-cable every stall with 8-wire cable terminated onto a BT at each stall.

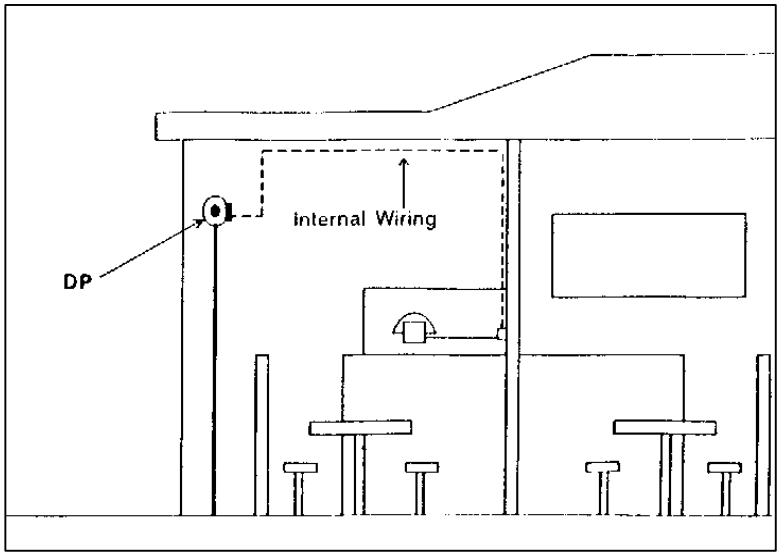

Fig.3-11 Market/Food/Hawker Centre

3.3.6 Factories (Terrace/Flatted)

3.3.6.1 The IP is designated at the DP.

3.3.6.2 Tenants/customers shall provide the cabling between the IP and their telecommunication equipment under the supervision of building owners. Alternatively, the building owners can pre-cable the factory unit with multi-core cable of twice the projected size for their tenants.

3.3.6.3 Building owners of flatted factories shall provide IDF verticals at the risers, and telephone distribution system within the buildings for concealing the cables.

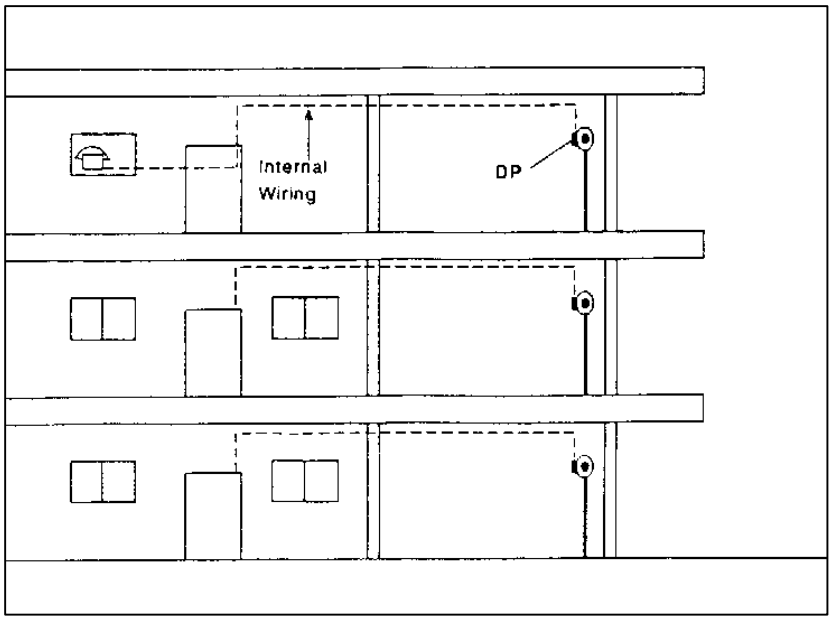

Fig.3-12 Flatted Factories

3.3.7 Multiple Buildings within a Compound (Campus Layout)

Two schemes are available:

a) COAM (Customer Owned And Maintain)

The telecommunication licensee shall erect a DP which will be the IP at only one building and the building owner shall provide his own cable linking to other buildings within the compound.

b) Non-COAM

The telecommunication licensee shall erect a DP which will be the IP at suitable locations within the compound with the building owner providing underground pipes to link up (in accordance with the telecommunication licensee specifications/requirements) with other buildings within the same compound.

In both cases, the tenants/customers shall provide the internal wiring between their telecommunication equipment and the IP.

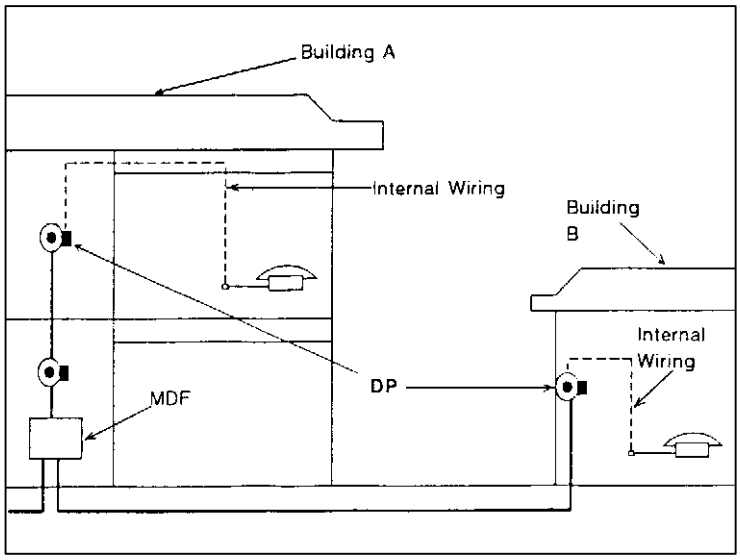

Fig.3-13 Multiple Buildings within a Compound

4 TELEPHONE CABLING STANDARDS

4.1 SURFACE CABLING

The following sections show the different ways that surface cables should be installed and distributed for better aesthetic of the building.

4.1.1 Exposed surface cabling

4.1.1.1 Exposed surface cabling should be installed along the wall surfaces by means of staples or cable clips. Staples should be used for attaching telephone cables (4-wire, 6-wire & 8-wire) onto wood or partitions. On the other hand, cable clips should be used for securing cables onto concrete or plaster surface.

4.1.1.2 To prevent the wire from sagging, staples or cable clips (3.5mm) should be spaced evenly at 350mm. The staples or clips should be spaced about 25mm away from the corners.

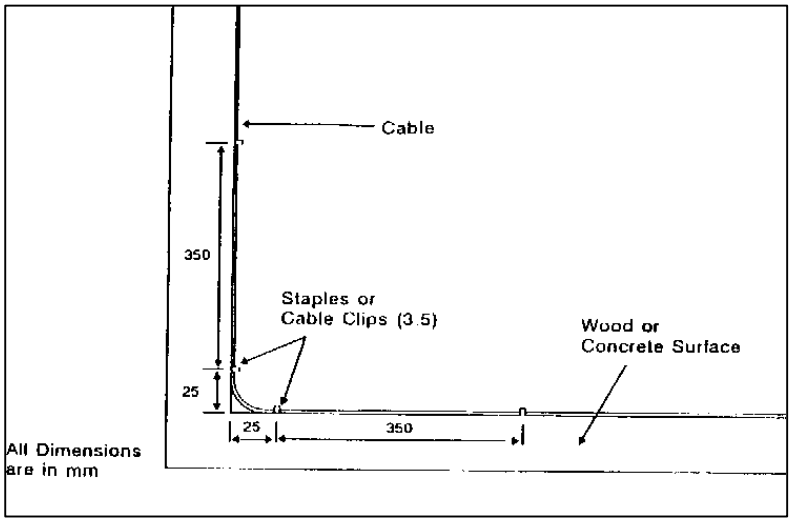

Fig.4-1 Staple/cable clip spacing

4.1.1.3 The cables should be routed horizontally or vertically along doorframes, wall corners and skirtings. To pass a cable from one room to the next, a hole should be drilled through the wall just above the doorway or in the angle between the doorframe and the skirting board. No cable should be run through the doorway. The door or door frame should not be cut to accommodate any cables running through it.

4.1.2 Installation of cables using PVC casing and batten

4.1.2.1 PVC casings/battens should be installed either horizontally or vertically.

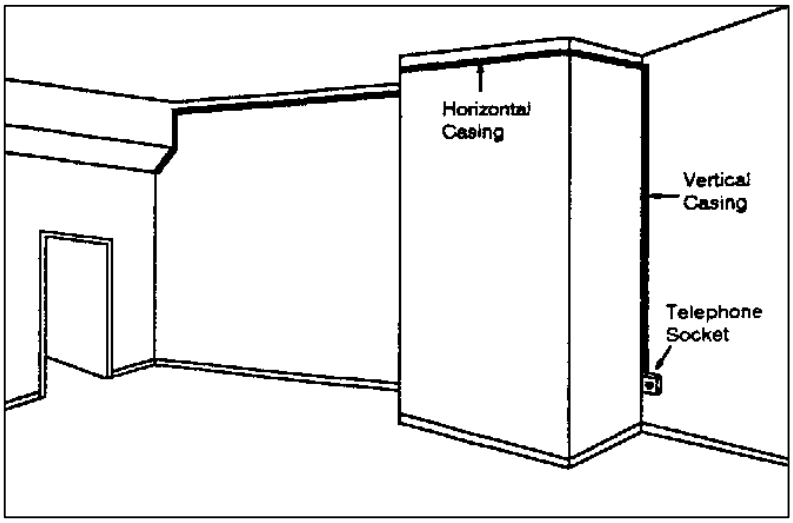

Fig.4-2 PVC casing/batten installation

4.1.2.2 PVC casing/batten shorter than 300mm should be fixed with at least two nails.

4.1.2.3 Cables should be secured onto the batten by using saddles fixed with brass nails at 250mm distance.

4.1.2.4 The nail at the end of the casing should not be more than 100mm from the end.

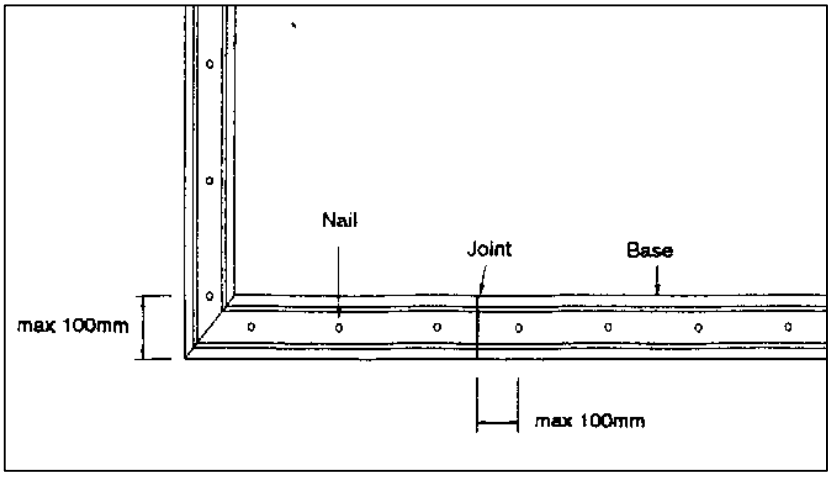

Fig.4-3 Spacing of nail from batten end

4.1.2.5 Where batten is installed through an opening in the beam, the batten should have no joint in the opening and its length should be such that there is 100mm length of batten at each end of the opening.

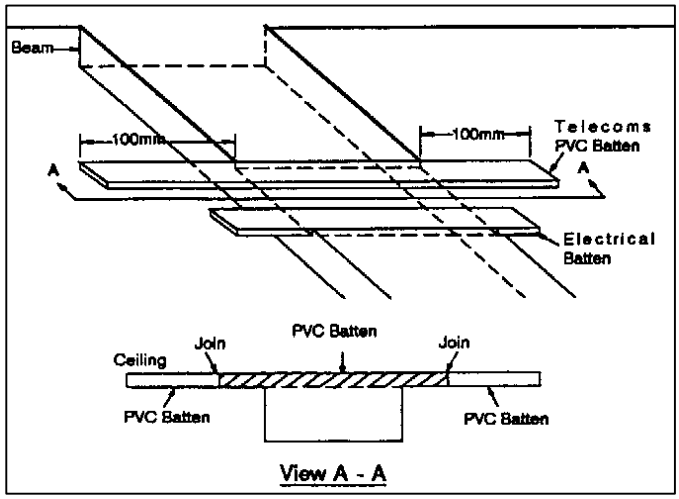

Fig.4-4 Batten through a beam

4.1.2.6 All angular joints should be cut and formed to conceal the cables fully on the batten or in the PVC casing.

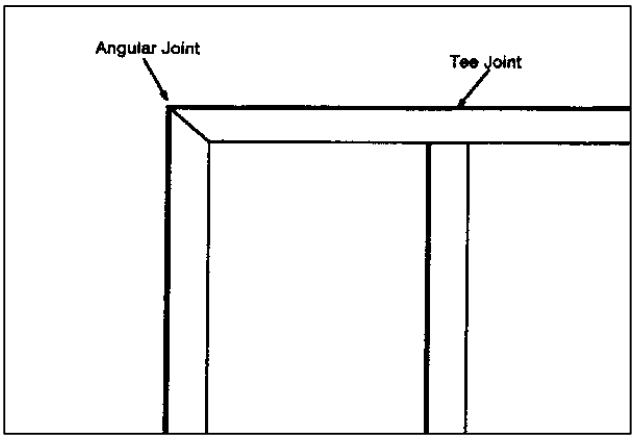

Fig.4-5 Angular joints in batten

4.1.2.7 Where batten and other services' casing, conduit, trunking, duct etc intersect, a crossover should be constructed to bridge the batten.

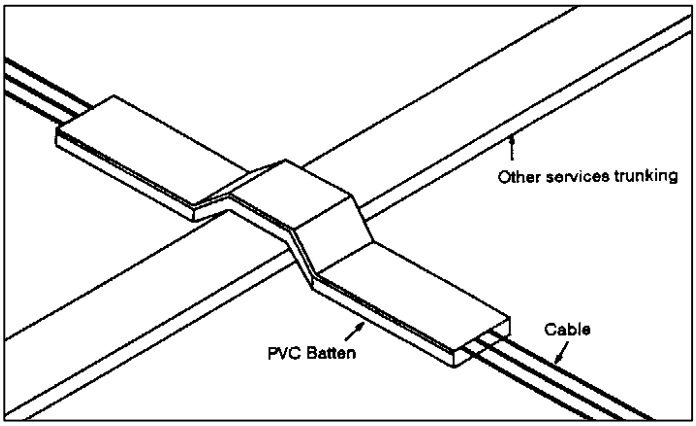

Fig.4-6 Crossover of batten

4.1.3 Installation of cables in multi-compartment PVC trunking

4.1.3.1 When installing telephone cables using multi-compartment PVC trunking, the telephone cables shall be segregated from the electrical cables.

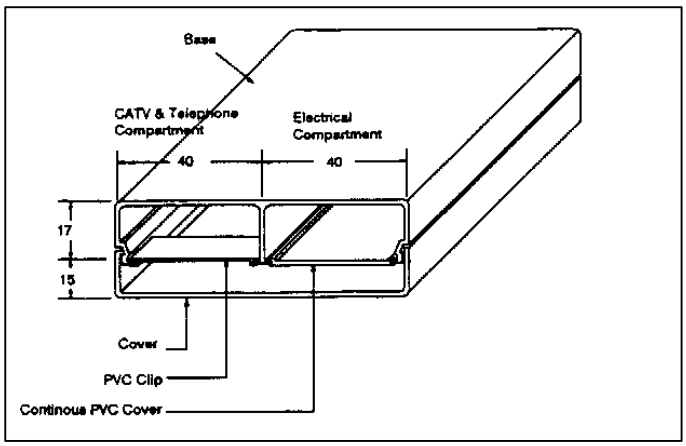

Fig.4-7 Multi-compartment PVC trunking

4.1.3.2 Continuous clips shall be provided throughout the electrical compartment of the trunking to provide segregation of the cables.

4.1.3.3 Electrical connectors shall not be installed in the telephone cable compartment.

4.1.3.4 Trunking running along the wall shall be installed with the electrical compartment nearer to the brim of the wall.

4.1.3.5 A continuous clip with a length of at least 150mm shall be provided in the telephone cable compartment where electrical cables cross over telephone cables.

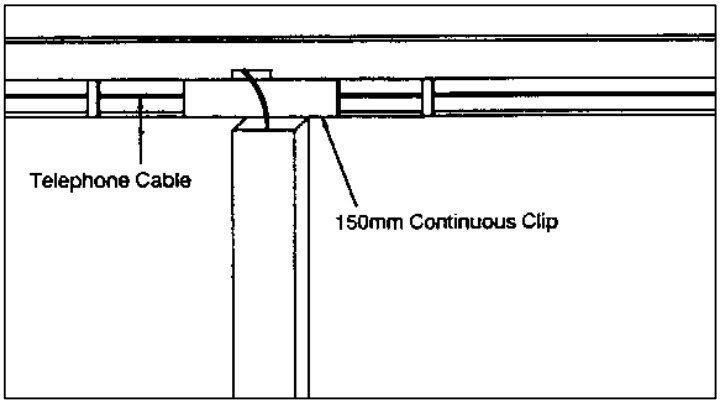

Fig. 4-8 Provision for continuous clip

4.1.3.6 A minimum of 7 nails shall be driven on a standard length of 2m PVC casing.

4.1.3.7 PVC saddle clips shall be fixed at intervals of not more than 250mm and not more than 125mm from both ends.

4.1.3.8 For a standard length of 2m PVC trunking, a minimum of 8 clips shall be fixed on the trunking.

4.1.4 Installation of cables in exposed cable tray

4.1.4.1 Cables should be arranged neatly on the tray with no slack.

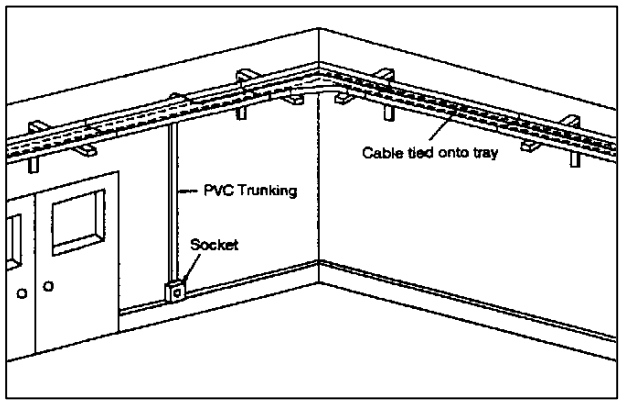

Fig.4-9 Cables in exposed cable tray

4.1.5 Installation of cables in conduit

4.1.5.1 The cable should be extended through the cover of the junction box to the desired telephone position with PVC casing.

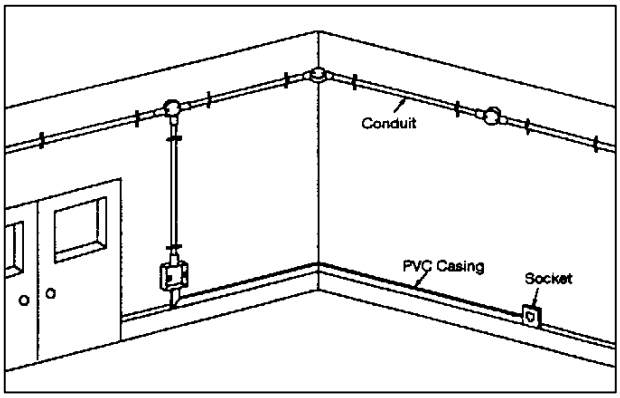

Fig.4-10 Cables in conduit

4.1.6 Installation of cables in exposed trunking

4.1.6.1 Cables should be left with minimal slack in the trunking or else there will be reduction in the trunking capacity. This will cause difficulty in subsequent cable installation.

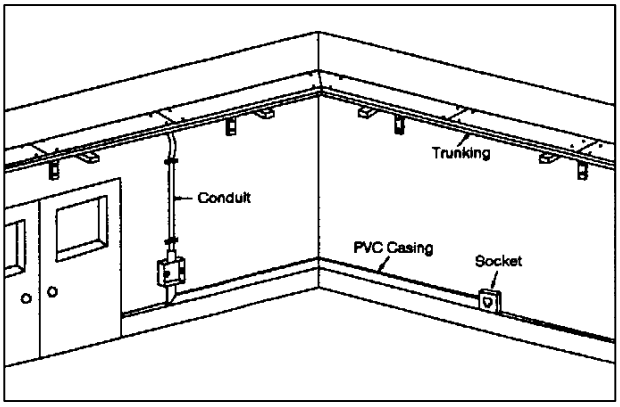

Fig.4-11 Cables in exposed trunking

4.2 Concealed Cabling

4.2.1 Installation of cables in Cellular Floor System

4.2.1.1 The Cellular Floor System has a floor structure consisting of cells spaced evenly all over the floor area. The cables are run in the cavity of the cell.

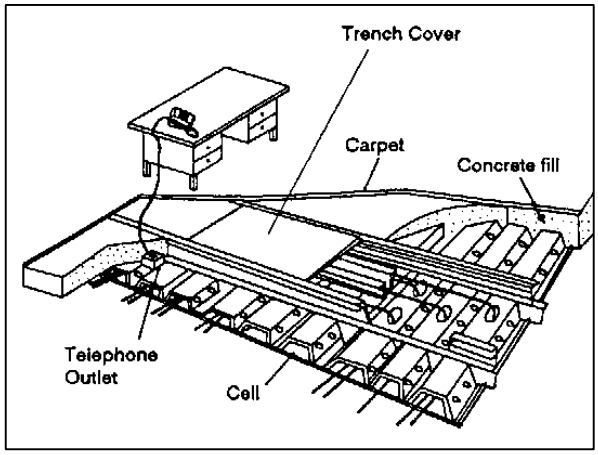

Fig.4-12 Cables in Cellular Floor System

4.2.1.2 The trench/duct provides access to floor cells which run at right angles to it.

4.2.1.3 The location of the trenches should be identified for easy access later.

4.2.2 Installation of cables in Raised Floor Distribution System

4.2.2.1 Cables should be laid in an orderly manner on the floor space between the two floors or on cable trays provided.

4.2.2.2 Cables laid on the floor shall be bundled or tied together.

4.2.2.3 Telephone cables laid on the floor should be isolated from cables of other services. This separation is essential for safety reasons.

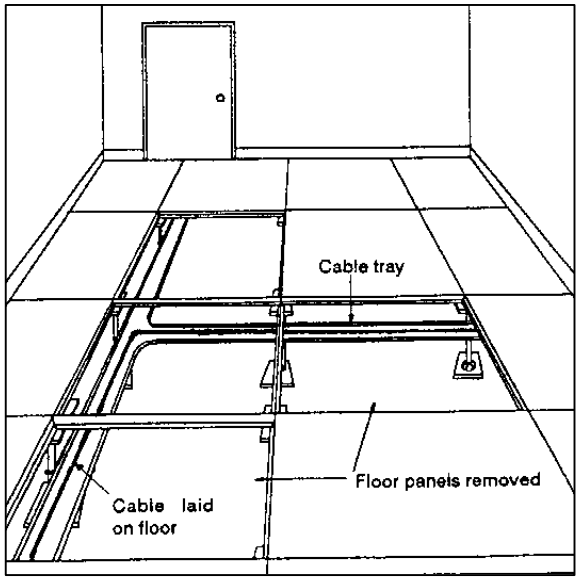

Fig.4-13 Cables in Raised Floor Distribution System

4.2.3 Installation of cables in Ceiling Distribution System

4.2.3.1 Cables laid on the cable trays should be properly arranged and secured with cable ties.

4.2.3.2 Cables should be extended through the conduit or other facilities provided to the desired telephone socket position.

4.2.3.3 When PVC casings are used to conceal the cables along the wall surfaces, a slot should be made at the corner of the ceiling board to bring the cables from the cable tray to the PVC casing.

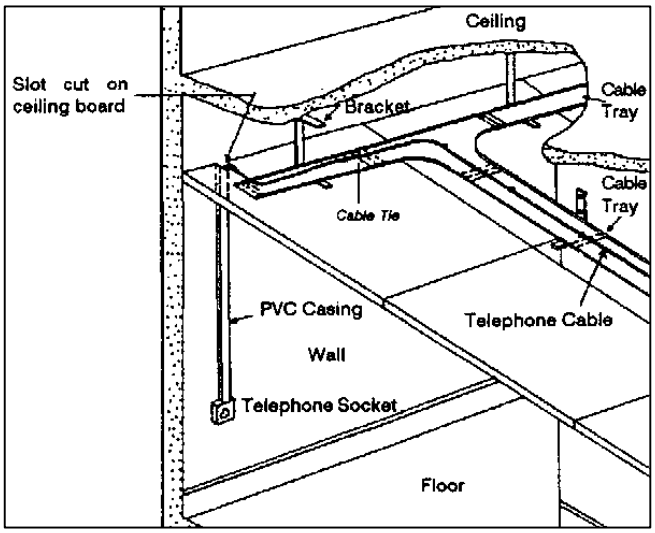

Fig.4-14 Cables in Ceiling Distribution System

4.2.3.4 When conduit is used, cables from the tray should be extended to the desired position through the conduits installed inside the partition.

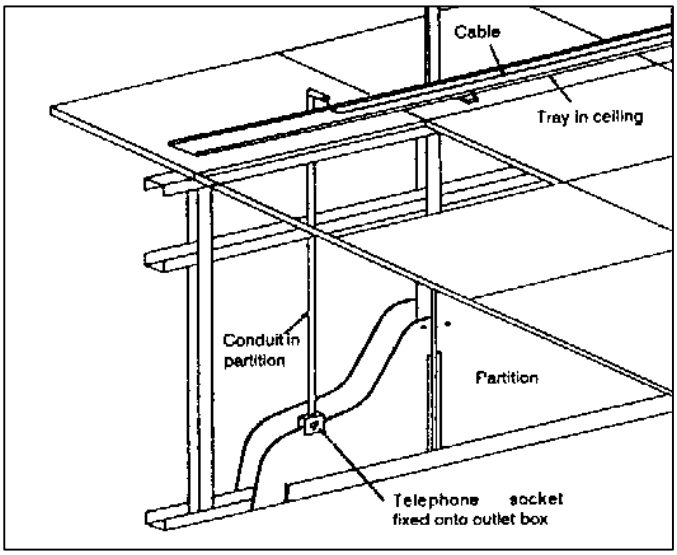

Fig. 4-15 Conduit in partition

4.2.4 Installation of cables in Utility Poles

4.2.4.1 Installation of cables in different types of Utility Poles is quite similar.

4.2.4.2 The variation in the cabling procedure for differing poles should depend on the method of gaining access into the cavity of the pole.

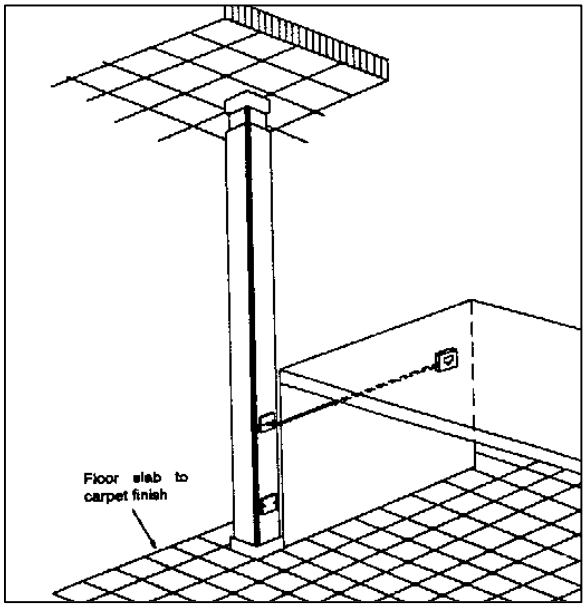

Fig. 4-16 Cables in Utility Poles

5 TERMINATION STANDARDS

5.1 TERMINATION OF CABLES ONTO DIFFERENT TYPES OF TERMINALS

5.1.1 Wrapping terminal

5.1.1.1 A wrapping gun should be used to wrap around the sharp corners of the terminals.

5.1.1.2 The number of turns shall not be less than 6 turns.

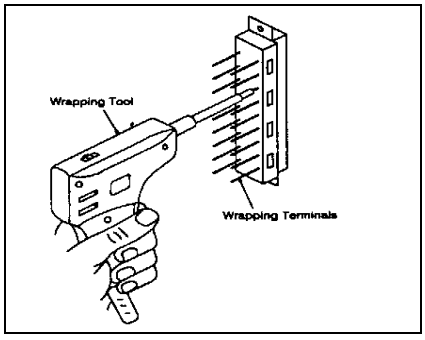

Fig.5-1 Wrapping gun in use

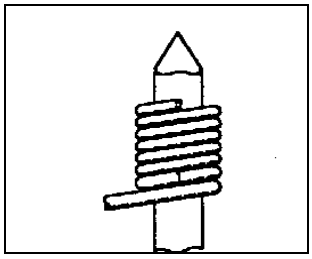

Fig.5-2 Number of turns

5.1.2 Soldering terminal

5.1.2.1 To connect a wire onto a soldering terminal, the conductor of the wire should first be threaded through the hole on the terminal if a hole is available and wrapped once round the notch before applying the solder to the wire.

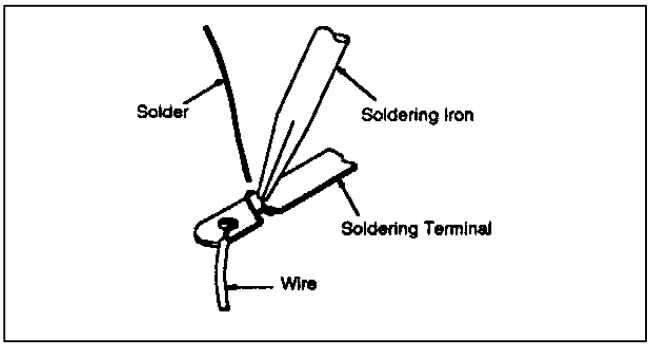

Fig.5-3 Soldering of terminal

5.1.3 Quick-Connect terminal

5.1.3.1 The wires to be terminated should be forced into the slot of the contact terminal with a spring-loaded impact tool or insertion tool.

5.1.3.2 The edge of the slot cuts the insulation of the wire as it passes through the terminal and the contact between the terminal and the conductor makes a sound electrical and mechanical joint.

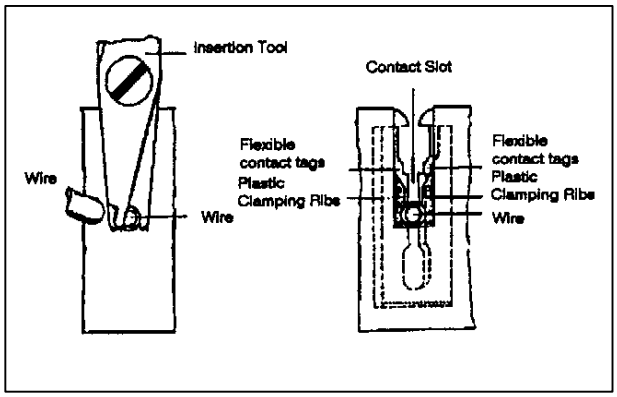

Fig.5-4 Termination of wire onto Quick-Connect terminal

5.1.4 Screw terminal

5.1.4.1 The length of insulation that needs to be removed should be just sufficient to enable the bare wire to wrap round the screw in a clockwise direction.

5.1.4.2 During the termination of 2 wires onto the terminal, the 2 wires should be twisted together.

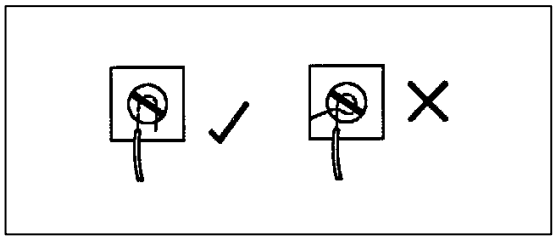

Fig.5-5 Termination of wire onto Screw terminal

5.2 TERMINATION OF CABLES ONTO DIFFERENT TYPES OF BLOCK TERMINALS/DISTRIBUTION CASES

5.2.1 Termination of Cables onto 2-pair Screw-Type Block Terminal

5.2.1.1 The exchange line from the DP should be terminated onto terminals 5 and 6 .The cable from the telephone socket should be secured to terminals 1 and 2.

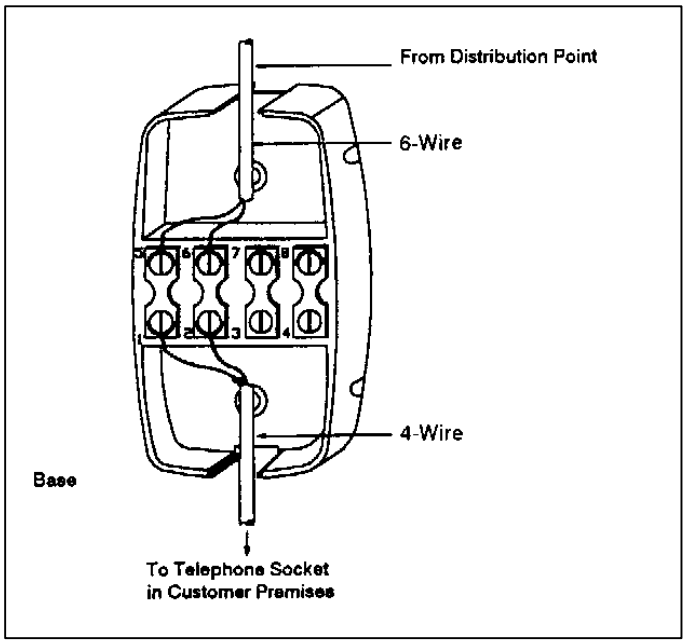

Fig.5-6 Termination of cables onto 2-pair Screw Type BT

5.2.2 Termination of Cables onto 10-pair Screw-Type Block Terminal

5.2.2.1 Spare cable pairs should be coiled around the working pairs of the same cable and they must be sufficiently long for future terminations.

5.2.2.2 Cable should be terminated with 20-30mm slack to avoid straining of the wire.

5.2.2.3 The sheath of the cable should be removed up to the cable entry point.

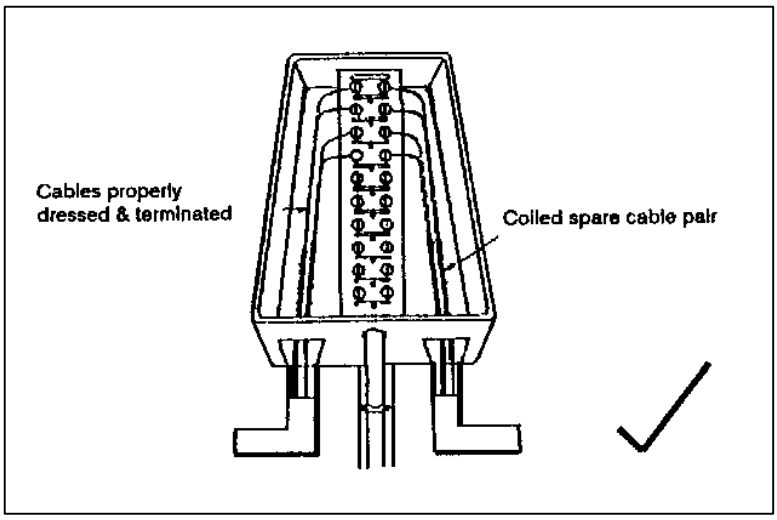

Fig.5-7 Termination of cables onto 10-pair Screw Type BT

5.2.3 Termination of Cables onto 10-pair Quick-Connect Block Terminal (BT68A)

5.2.3.1 The individual wires of the 10-pair cable and the 4-wire cables should be terminated directly onto the terminals by means of an insertion tool.

5.2.3.2 The sequence of termination is illustrated below.

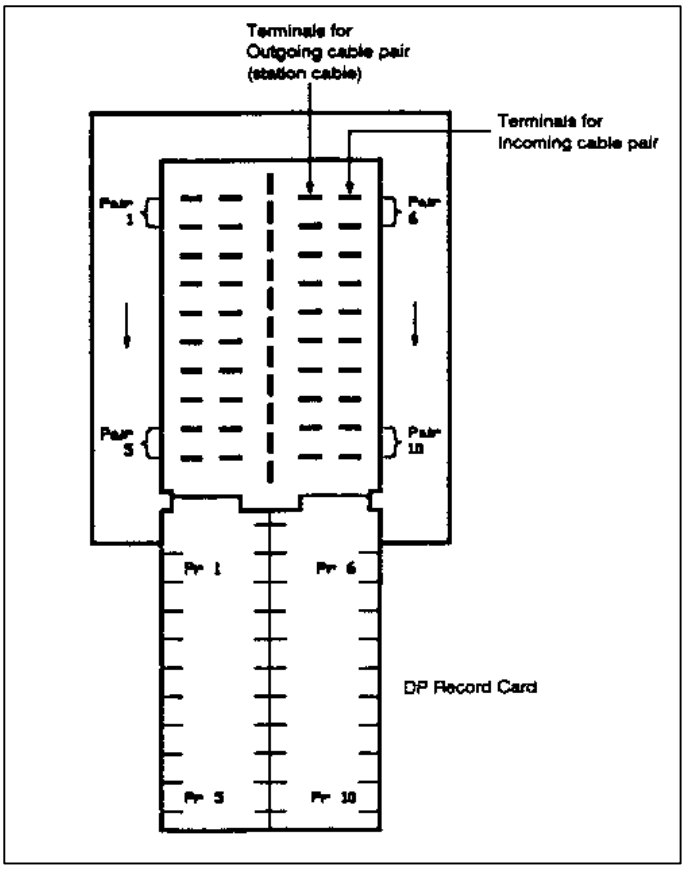

Fig.5-8 Termination of cables onto 10-pair
Quick-Connect BT (BT68a)

5.2.4 Termination of Cables onto 20/40-pair Quick-Connect Distribution Case

5.2.4.1 The cables should not be run across the faces of the terminal strips.

5.2.4.2 Wires of the same pair should not be split.

5.2.4.3 Cables should be terminated with 20-30mm slack.

5.2.4.4 Any spare cable pairs not wired to terminal should be long enough to reach any terminals and coiled around the working pairs of the same cable.

5.2.4.5 Each cable should be passed through the guides provided and follow the raceways formed by the space between modules in the following manner:

Pair 1 to 5 through the jumper rings on the left and pair 6 to 10 through the jumper rings on the right.

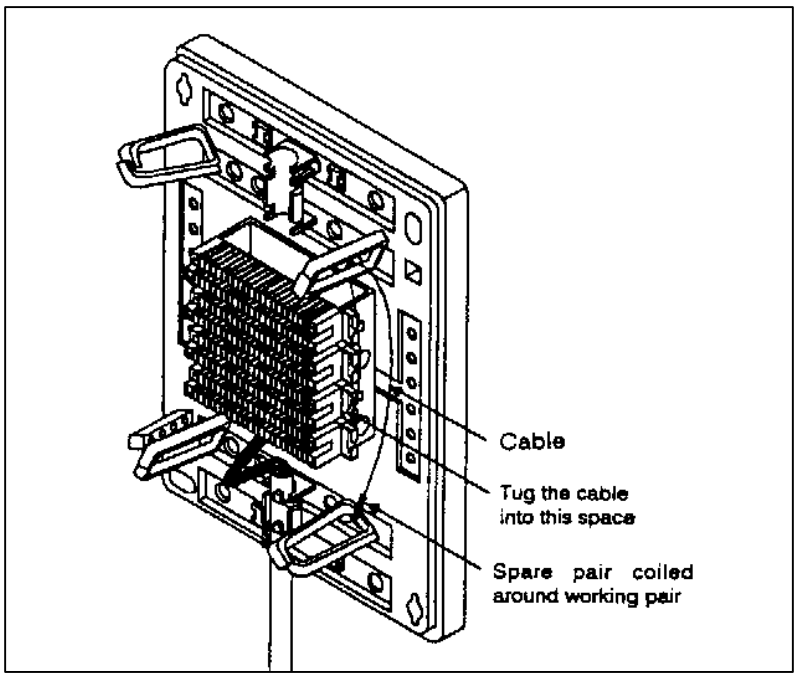

Fig.5-9 Termination of cables onto 20/40-pair
Quick-Connect Distribution Case

6 FUNCTIONAL TESTS

The cabling has to be tested to ensure that the cables are in good condition and connections correctly terminated. The tests on cable connections involve the Continuity Test, Open Circuit Test and Insulation Resistance Test using a Tone Test Set. The testing procedures are as follows:

6.1 CONTINUITY TEST

6.1.1 Steps:

a) Short circuit the WH `A' and BL `B' wires at the DP end. (Note: WHITE `A' and BLUE `B' wires must be disconnected from DP terminal)

b) Plug in the Tone Test Set to the socket and set the function switch to Resistance Mode as shown in Figure 6-1.

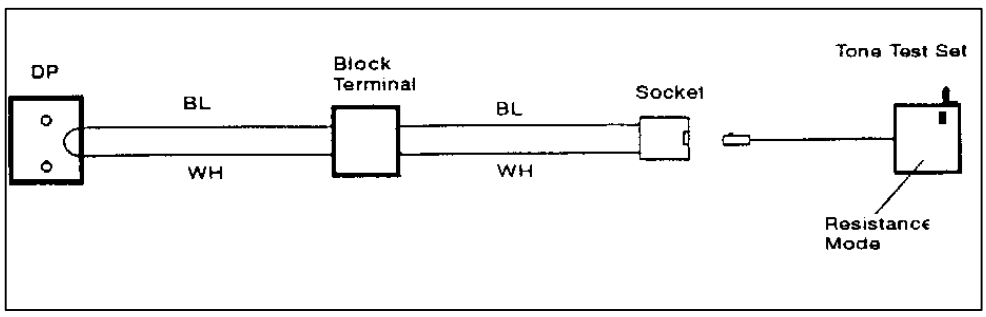

Fig.6-1 Continuity Test

6.1.2 Test Results

a) If a tone is generated, the cabling is in good condition.

b) If no tone is generated, the cable has an open circuit. Trace the fault and repeat the Continuity Test procedures after rectification.

6.2 OPEN CIRCUIT TEST AND INSULATION RESISTANCE TEST

6.2.1 Steps:

a) Remove the short circuit on the WH`A' and BL`B' wires at the DP end. (Note: WHITE `A' and BLUE `B' wires must be disconnected from DP terminals).

b) To determine the reference value of 1 MW Insulation Resistance, touch the red clip lead to the screw head of the Tone Test Set. Beep tones can be heard to indicate a value of 1 MW Insulation Resistance.

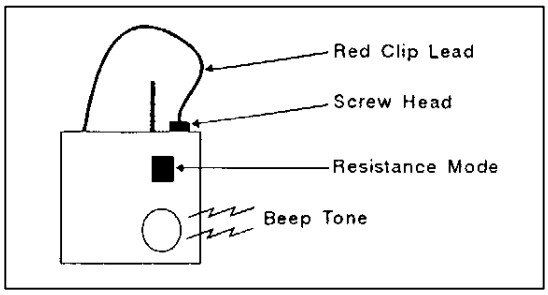

Fig.6-2 Obtaining reference value of 1 MW Insulation Resistance

c) Do not remove the Tone Test Set from the socket and set the function to Resistance Mode as shown.

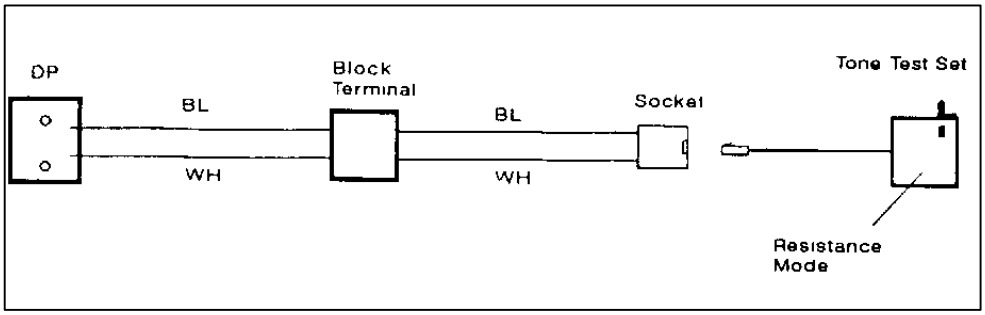

Fig.6-3 Open Circuit and Insulation Resistance Test

6.2.2 Test Results

a) If no tone is generated or the interval between tones is slower than the reference value, the cabling is in good condition.

b) If a tone is generated or the interval between tones is faster than the reference value, the cable has a short circuit or low insulation resistance. Trace the fault and repeat the Open Circuit Test and Insulation Resistance Test procedures upon rectification.

7 CABLE RECORD KEEPING

Cable Record Keeping is an important form of practice. Proper documentation of the installation undertaken can result in efficient and safe operation of complex installations. A good record should keep track of the status of existing installations for future installation needs and maintenance of cabling system. It should have the following information:

a) Building drawings showing the cable distribution system layout.

b) Building drawings or schematic drawings showing the cable routings, sizes and quantities from the telecommunication licensee IP to as far as the telephone outlets.

c) Layout drawings or record cards for the recording of the jumpering at local Distribution Cases (Discases) or IDF blocks in telephone risers, cable closets and telephone system equipment rooms.

d) All cabling and user outlet wirings should be numbered or labelled. These numberings or labelling should be reflected in the cable drawings or schematic diagrams.

8 SAFETY PRECAUTIONS AND PRACTICES

a) A careful survey of cabling route should be made to ensure that the most suitable is selected.

b) Telephone cables shall be segregated from electrical cables at all intersection points.

c) Insulation sleeves shall be provided for telephone cables crossing electrical wires.

d) Items associated with the installation should be located so that they do not create a hazard to the occupants of the premises or to installation or maintenance staff.

e) Sockets for telecommunication should be fitted in locations that minimise the risk of damage.

f) Only materials that comply to IDA “Specifications for Telecommunication Cables and Ancillary Accessories” or any specification for telecommunication wiring installations in residential and business premises to be designated by IDA should be used in any installation work.

g) Only proper tools should be employed in installation work. Any attempt to misuse any tools will result in unwanted damage or even risk getting injured.

h) As soon as work is completed at any access point, all internal fittings, the cover and its fixing screws should be properly secured.

i) A final check of all covers that have been removed should be made before leaving the premises to ensure that the covers and screws are correctly replaced.

APPENDIX A

TELEPHONE CABLES

A.1 TYPES OF CABLES

The types of cables used for telephone installation works are listed in the table below:

Type of Cable	Use
4-wire Grey PVC cable	Internal cabling *
6-wire Grey PVC cable	Internal cabling, switching telephone system
8-wire Grey PVC cable	Internal cabling, switching telephone system
10-wire Grey PVC Cable	Local cabling **, executive/secretary system
10-pair Grey PVC Cable	Local cabling
20-Pair Grey PVC Cable	Local cabling, executive/secretary system
40-Pair Grey PVC Cable	Local cabling
80-Pair Grey PVC Cable	Mass local cabling
100-Pair Grey PVC Cable	Mass local cabling

Table A-1: **Types of cables and their uses**

Notes: Internal cabling - Refer to cabling from distribution case to individual socket position.

Local cabling - Refer to cabling from riser to distribution case.

A.2 COLOUR CODE OF CABLES

A.2.1 COLOUR CODE FOR LOW COUNT (4, 6, 8, 10-WIRE) PVC CABLES

Cable Size	4-Wire		Pair Count	6-Wire		8-Wire		10-wire	
				a-Wire	b-Wire	a-Wire	b-Wire	a-Wire	b-Wire
Remarks: 1. For 4-Wire cables, blue and orange comprise the first element (Pair). 2. Base colours are in capital letters. Small letters represent helix or ring markings on the base colour. 3. NA - Not applicable	a-Wire	BLUE	1	WHITE - blue	BLUE - white	WHITE - blue	BLUE - white	WHITE - blue	BLUE - white
	b-Wire	ORANGE	2	WHITE - orange	ORANGE - white	WHITE - orange	ORANGE - white	WHITE - orange	ORANGE - white
	c-Wire	GREEN	3	WHITE - green	GREEN - white	WHITE - green	GREEN - white	WHITE - green	GREEN - white
	d-Wire	BROWN	4	NA	NA	WHITE - brown	BROWN - white	WHITE - brown	BROWN - white
			5	NA	NA	NA	NA	WHITE - grey	GREY - white

Table A-2: **Colour Code for Low Count (4, 6, 8 and 10-wire) PVC Cables**

A.2.2 COLOUR CODE FOR HIGH COUNT (10, 20, 40, 80 AND 100-PAIR) PVC CABLES

Counting Block	Colour Block	Element No.	Colour of Wire Insulation	
			a-wire	b-wire
1	W H I T E	1 2 3 4 5	WHITE-blue WHITE-orange WHITE-green WHITE-brown WHITE-grey	white-BLUE white-ORANGE white-GREEN white-BROWN white-GREY
	R E D	6 7 8 9 10	RED-blue RED-orange RED-green RED-brown RED-grey	red-BLUE red-ORANGE red-GREEN red-BROWN red-GREY
	B L A C K	11 12 13 14 15	BLACK-blue BLACK-orange BLACK-green BLACK-brown BLACK-grey	black-BLUE black-ORANGE black-GREEN black-BROWN black-GREY
	Y E L L O W	16 17 18 19 20	YELLOW-blue YELLOW-orange YELLOW-green YELLOW-brown YELLOW-grey	yellow-BLUE yellow-ORANGE yellow-GREEN yellow-BROWN yellow-GREY
2	Same as above			
3	Same as above			
4	Same as above			
5	Same as above			

Table A-3: **Colour Code for High Count PVC Cables**

Remarks

i. For the above table, an element refers to 1 pair.

ii. The cabling sequence will be from centre to the outside.

iii. Where sub-units of either 5 or 10-element are used, it shall be used throughout.

iv. For a 20-element unit made up of 5-element sub-units, the elements of the first sub-unit shall be sequenced 1 to 5, the second 6 to 10, the third 11 to 15 and the fourth 16 to 20.

v. For a 20-element unit made up of 10-element sub-units, the elements of the first sub-unit shall be sequenced 1 to 10 and the second 11 to 20.

vi. The base colour is shown in capital letters. Colour for ring or helix is shown in small letters.

APPENDIX B

GUIDELINES ON CABLE SIZE AND THE ASSOCIATED BLOCK TERMINAL

B.1 Guidelines on the Size of Cables and the associated Block Terminals/Discases for Business Premises

No. of Lines applied (per Premises Basis)	Cable size to be installed from DP to Doorstep	Size of Block Terminal(BT)	
		Doorstep	Riser(DP)
1 to 3	8-wire	4-pair	Not Required (Direct Termination)
4	10-wire	10-pair	Not Required (Direct Termination)
5 to 8	10-pair	20-pair	20-pair
9 to 15	20-pair	20-pair	20-pair
16 to 32	40-pair	40-pair	40-pair
32 to 100	80/100-pair	100-pair	100-pair

Table B-1

B.2 Guidelines on the Size of Cables and the associated Block Terminals for Residential Premises

Type of Premises		Cable Size from DP to BT	Cable Size from BT to Socket	Size of BT	Cable Size from DP to Socket
HDB Flat (Non-Service Duct)		6-wire	4-wire	2-pair (doorstep)	-
HDB Flat (Service Duct)		-	-	-	6-wire
Private House	DP at car porch or store room in the house	2 Nos. of 8-wire	1 No. of 8-wire	5-pair BT - located inside unit	
	DP at gate pillar	1 No. 5-pair polyethylene cable			
Private Apartment & Condominium		2 Nos. of 8-wire	1 No. of 8-wire	5-pair BT - located inside unit	

Table B-2

APPENDIX C

TELEPHONE WIRING CONFIGURATION FOR PRIVATE RESIDENTIAL BUILDINGS

C.1 Telephone Wiring Configuration for Private Residential Buildings

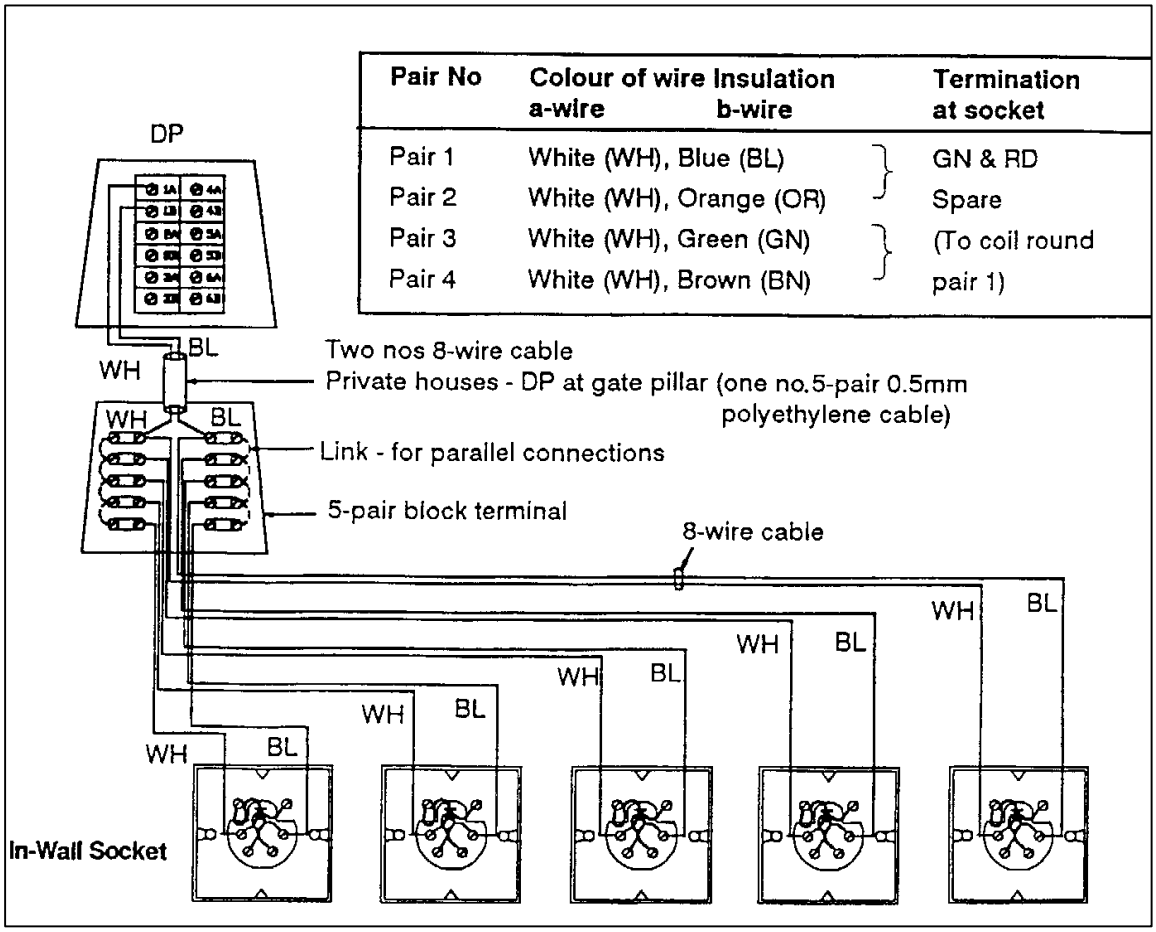

Fig. C-1 8-wire cable colour code and termination

ANNEX I

SPECIFICATIONS FOR TELECOMMUNICATION CABLES AND ANCILLARY ACCESSORIES

I.1	IDA TS L1-1 : 2000	Specification for High Count PVC Cable
I.2	IDA TS L1-2 : 2000	Specification for Low Count PVC Cable
I.3	IDA TS L2-1 : 2000	Specification for 4-Way Modular On Wall Socket
I.4	IDA TS L3-1 : 2000	Specification for 2-Pair Block Terminal
I.5	IDA TS L3-2 : 2000	Specification for 4-Pair Block Terminal
I.6	IDA TS L3-3 : 2000	Specification for 5-Pair Block Terminal