Telstra Operations
Access Technology

Specification
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Access Network Design

Designers Application Guide (New Infrastructure)

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1. PURPOSE

This specification outlines basic capacities and application of new joints, pits, conduits and cables in the Access Network. This document is written from a designer's perspective to cover normal design work within the Access Network. It does not cover some of the more detailed technical specifications that are found in other Appendices.

It shall be noted the designer may make a number of theoretical calculations to allow a design to proceed. The designer may request some form of field evaluation or assessment where uncertainty exists. At the end of the day it is the responsibility of the designer to ensure that the design will be the most cost effective and efficient. The designer must also ensure that the design is functional and its installation will not damage any new or existing infrastructure.

This specification is not intended to provide information on legislative, environmental, health, safety or general procedural matters. It is important the designer reads this document in conjunction with the other references referred too.

2. GENERAL

2.1. Material

All material must conform to Telstra approved specifications.

2.2. Compliance with Telstra approved practices

The designer shall ensure that designs meet with the requirements of the Disability Discrimination Act 1992 where it applies to the design, in that civil works are not located close to or compromise the use of existing, planned or proposed pedestrian crossings, tactile surfaces or any facility existing, planned or proposed for use by disabled pedestrians.

Any construction shall conform to Telstra approved practices/agreements. As such, the design and any drawings (plans) must refer to the constructor complying with approved practices.

3. DESIGN CONSIDERATIONS

3.1. Copper cable core types

In the Access Network there are two core types used in copper cables – grease-filled (CPFUT) and air-core (CPIUT). Refer to Tables 2, 3 & 4 for typical cable types used in large main cable, direct buried rural, urban distribution and small commercial lead-in projects.

3.1.1. CPIUT – Cellular Polyethylene Insulated, Unit Twin (air core cable)

This type of cable is commonly known as "air-core" cable and can only be used where air pressure compressors are available at the local exchange. The air is introduced into the cable to provide a positive pressure within the cable and protect it from moisture entry (wherever possible grease-filled cable shall be used to minimise pressurisation issues). This type of cable is typically used:

- To replace an "in length" section of air core cable.
- In new network where pair requirements exceeds 800 pairs.

3.1.2. CPFUT – Cellular Polyethylene Insulated, Filled Core, Unit Twin (jelly filled cable)

This type of cable is commonly known as “jelly-filled” cable and is used extensively in the network for lead-ins, distribution and mains. The jelly fill is introduced into the cable at the manufacturing stage to protect it from moisture entry. The jelly-fill localises any water entry through the sheath and is not reliant on air pressure to protect the cable. This type of cable core is used to:

- Connect a new cable from the exchange to a RIM, CMUX, pillar
- Connect a new cable from the RIM, CMUX, Pillar to the customer
- Extend an existing length of air-core or jelly-filled cable.
- Replace a faulty section of jelly-filled cable
- Replace a faulty section of air-core cable where using a filled cable proves to be the most cost-effective option.

NOTE: An air seal is to be installed at the interface point between the air- core cable and the jelly-filled cable, and an air bypass tube may be required if there is air core cable beyond the interface.

3.2. Sheath types

There are 5 combinations of sheath types available for use in the network

3.2.1. PE – Polyethylene

This type of cable is commonly used in conduits where there is no likely hood of sheath attack from ants and termites.

3.2.2. PEHJ – Polyethylene, Hard Jacket

This type of cable is commonly used in conduits and there is a likely hood of sheath attack from ants and termites.

3.2.3. MB – Moisture Barrier

The moisture barrier screen (which is a thin lining of aluminium) provides two primary functions. Firstly the barrier acts as an additional form of protection against moisture entry. Secondly by ensuring a “screen continuity” from the exchange earth, reduces interference “noise” from external sources (eg over power lines, electric fences).

3.2.4. MBHJ – Moisture Barrier, Hard Jacket

This type of cable is commonly used for direct buried cable where there is a likelihood of sheath attack from ants and termites. Some Telstra regions may determine attack is possible within the entire region and specify cables accordingly.

3.2.5. MBHJSJ - Moisture Barrier, Hard Jacket, Sacrificial Jacket

This type of cable is commonly used for direct buried cables and where there is a likelihood of cable attack from ants and termites. There is also an additional sacrificial jacket when installed in an extremely harsh and rocky environment where there is a likelihood of sheath damage during and after the installation plough or to prevent damage to Hard Jacket during cable hauling.

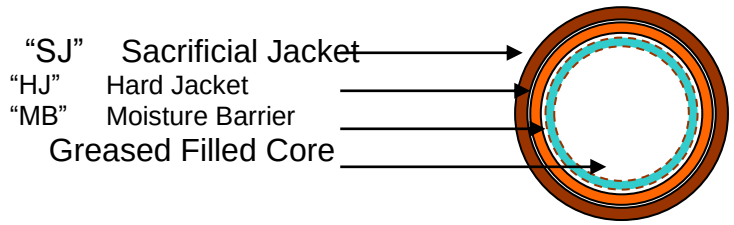


Figure 1: Typical "MBHJSJ" Cable Cross Section

The designer may use the following cable diameters for estimating conduit capacities as described above. (Add 1mm for each additional sheath additive, eg hard jacket, moisture barrier, sacrificial jacket.)

Pair Count	Approx. cable diameter for 0.40mm	Approx. cable diameter for 0.64mm	Approx. cable diameter for 0.90mm
2	4	NA	NA
5	5	6	NA
10	10	14	17
30	13	19	26
50	16	24	33
100	22	32	45
200	28	39	53
300	32	46	65
400	35	51	72
600	41	61	85
800	47	69	
1200	56	85	

Table 1: Approximate cable diameters

3.2.6. Large Main Cable

Cable Type	Filled Cable	Filled Cable	Filled Cable	Filled Cable	Filled Cable	Air Core [1]	Filled Cable	Filled Cable	Filled Cable	Air Core Cable
Cable Core Code	CPFUT	CPFUT	CPFUT	CPFUT	CPFUT	CPIUT [1]	PEIFLI	PEIFLI	PEIFLI	PEILI/PEIUT
Sheath Code	PE	PEHJ	MB	MBHJ	MBHJSJ	MB	PE	PEHJ	MBHJ	IB
	Cable Gauge – Conductor Diameter (mm's)									
2 Pairs							0.40	0.40		0.64
5 Pairs							0.40			
10 Pairs	0.40	0.40		0.64 &0.90						0.40 & 0.64
30 Pairs	0.40	0.40		0.64 & 0.90						
50 Pairs	0.40	0.40		0.64 & 0.90						0.40 & 0.64
100 Pairs	0.40			**0.40 & 0.64**						0.40 & 0.64
200 Pairs			**0.40 & 0.64***		**0.40 & 0.64***					
400 Pairs			**0.40*&0.64 ***		**0.40*, 0.64***					
800 Pairs			**0.40***			**0.40*[1],0.64*[1]**				
1200 Pairs						**0.40*[1]**				
2400 Pairs						**0.40*[1]**				

In Conduit

Direct buried

Those cables marked with the darker shading and [1] are "air-core" cables and are limited to:

- To replace a "in length" section of air core cable.
- In new network where pair requirements exceeds 800 pairs.

Notes

- The standard cable drum length is 1,000m.
- Those cables marked with a * are too large to fit on a standard drum.
- These cables are to be ordered to project specific lengths
- Those cables shaded grey are most likely to be used for large main or branch cable reticulation

Table 2: Available Cable Sizes and Types (Large Main or Branch Cable Applications)

3.2.7. Direct Buried Rural Cables

Cable Type	Filled Cable	Filled Cable	Filled Cable	Filled Cable	Filled Cable	Air Core	Filled Cable	Filled Cable	Filled Cable	Air Core Cable
Cable Core Code	CPFUT	CPFUT	CPFUT	CPFUT	CPFUT	CPIUT	PEIFLI	PEIFLI	PEIFLI	PEILI/PEIUT
Sheath Code	PE	PEHJ	MB	MBHJ	MBHJSJ	MB	PE	PEHJ	MBHJ	IB
	Cable Gauge – Conductor Diameter (mm's)									
2 Pairs							0.40	0.40		0.64
5 Pairs							0.40			
10 Pairs	0.40	0.40		**0.64 &0.90**						0.40 & 0.64
30 Pairs	0.40	0.40		**0.64 & 0.90**						
50 Pairs	0.40	0.40		**0.64 & 0.90**						
100 Pairs	0.40			**0.40 & 0.64**						
200 Pairs			0.40 & 0.64*		**0.40 & 0.64***					
400 Pairs			0.40* &0.64*		**0.40*, 0.64***					
800 Pairs			0.40*			0.40*, 0.64*				
1200 Pairs						0.40*				
2400 Pairs						0.40*				

Direct buried

For rural cables the moisture barrier screen (which is a thin lining of aluminium) provides two primary functions.

- Firstly the "MB" acts as an additional form of protection against moisture entry.
- Secondly by ensuring a "screen continuity" from the exchange earth, reduces interference "noise" from external sources (eg over power lines, electric fences).

Notes

- The standard cable drum length is 1,000m. Those cables marked with a * are too large to fit on a standard drum.
- These cables are to be ordered to project specific lengths
- Those cables shaded grey are most likely to be used for rural cable reticulation

Table 3: Available Cable Sizes and Types (Direct Buried Rural Cable Application)

3.2.8. Urban Distribution & Small Commercial Lead – Ins

Cable Type	Filled Cable	Filled Cable	Filled Cable	Filled Cable	Filled Cable	Air Core	Filled Cable	Filled Cable	Filled Cable	Air Core Cable
Cable Core Code	CPFUT	CPFUT	CPFUT	CPFUT	CPFUT	CPIUT	PEIFLI	PEIFLI	PEIFLI	PEILI/PEIUT
Sheath Code	PE	PEHJ	MB	MBHJ	MBHJSJ	MB	PE	PEHJ	MBHJ	IB (Aerial)
	Cable Gauge – Conductor Diameter (mm's)									
2 Pairs				Standard Residential Lead-ins →			**0.40**	**0.40**		**0.64**
5 Pairs							**0.40**			
10 Pairs	**0.40**	**0.40**		0.64 &0.90						0.40 & 0.64
30 Pairs	**0.40**	**0.40**		0.64 & 0.90						
50 Pairs	**0.40**	**0.40**		0.64 & 0.90						0.40 & 0.64
100 Pairs	**0.40**			0.40 & 0.64						0.40 & 0.64
200 Pairs			0.40 & 0.64*		0.40 & 0.64*					
400 Pairs			0.40*&0.64 *		0.40*, 0.64*					
800 Pairs			0.40*			0.40*, 0.64*				
1200 Pairs						0.40*				
2400 Pairs						0.40*				

Notes

- The standard cable drum length is 1,000m. Those cables marked with a * are too large to fit on a standard drum.
- These cables are to be ordered to project specific lengths
- Those cables shaded grey are most likely to be used for urban pit & conduit cable reticulation.
- PEHJ should only be considered where there is the likelihood of sheath attach from white ant and termites.
- The designer needs to check the cable and joint combination fits in the pit.
- Aerial lead-ins: 2/0.40 ALIC and 2/0.64 (PEILI).
- 10/0.64 MBHJ underground lead-ins to be used as the minimum rural lead-in.

Table 4: Available Cable Sizes and Types (Urban Distribution & Small Commercial Lead-ins)

3.3. Street Pit & Cable Combination Guide

3.3.1.1. (0.40mm) cables in pits

	P5 pit		P5 pit with collar		P6 pit		P8 Pit or P6 pit with collar or concrete 8 pit		P9 Pit or concrete 9 pit		Manhole	
Joint Type and sizes allowed in pit	THSJ S-L	In line 1-2	THSJ S-L	In line 1-2	THSJ S-L	In line 1-2-3	THSJ S-L	In line 1-2-3	THSJ S-L	In line 1-2-3-4	THSJ S-L	In line 1-2-3-4
10/0.40 PE	S	1	S	1	S	1	S	1	S	1	S	1
10/0.40 PEHJ	S	1	S	1	S	1	S	1	S	1	S	1
30/0.40 PE	S	1[2]	S	1[2]	S	1	S	1	S	1	S	1
30/0.40 PEHJ	S	1[12]	S	1[12]	S	1	S	1	S	1	S	1
50/0.40 PE	S	2[2]	S	2[2]	S	2	S	2	S	2	S	2
50/0.40 PEHJ	S[1]	2[12]	S[1]	2[12]	S	2	S	2	S	2	S	2
100/0.40 PE	L		L		L	3	L	3	L	3	L	3
100/0.40 PEHJ	L[1]		L[1]		L	3	L	3	L	3	L	3
100/0.40 MBHJ	L[1]		L[1]		L	3	L	3	L	3	L	3
200/0.40 MB						3		3		3		3
200/0.40 MBHJSJ										3		3
400/0.40 MB										4		4
400/0.40 MBHJ										4[12]		4
800/0.40 MB										4		4

Notes

- THSJ = Telstra Heat Shrink Joint (THSJ) [S = Small, L = Large, X = Extra Large]
- In-line = In Line XAGA 550 joints [Type “1” = 43/8-100, Type “2” = 43/8-200, Type “3” = 75/15-250, Type “4” = 122/30-500] ,
- The type of in line joint to use is dependant on the cluster of cables to be jointed and the number and type of connectors.
- The chart only shows the indicative in line joint that would fit in the pit if the cable identified on the left of the chart were the largest cable to be installed and no other smaller combinations would exceed the bending requirements at that joint.
- The user should refer to Attachment 4B to determine the specific joint size.
- This information is only intended for new pits with new street distribution cables.
- Older style pit capacities and capacities for lead-ins can be found in work instruction 010255W03 & W04

[1] To permit the use of the marked pits, for hard jacketed cables where there are no ant or termite problems, the hard jacket may be stripped to within 100mm of the pit entry to reduce the need for a larger pit.
[2] .To permit the use of the marked pits, the cable joint must be placed diagonally within the pit to utilise a smaller pit

Table 5: Typical single joint to fit in a new pit or manhole for 0.40mm filled cables

3.3.1.2. 0.64 & 0.90mm cables in pits

	P5 pit		P5 pit with collar		P6 pit		P8 Pit or P6 pit with collar or concrete 8 pit		P9 pit or concrete 9 pit		Manhole	
Joint Type and sizes allowed in pit	HSJ S-L	In line 1	HSJ S-L	In line 1	HSJ S-L-X	In line 1-2-3	HSJ S-L-X	In line 1-2-3	HSJ S-L-X	In line 1-2-3-4	HSJ S-L-X	In line 1-2-3-4
10/0.64 MBHJ	S	1[12]	S	1[12]	S	1	S	1	S	1	S	1
30/0.64 MBHJ	L[12]		L[12]		L	1	L	1	L	1	L	1
50/0.64 MBHJ	L[12]		L[12]		L	2[12]-3[12]	L	2-3	L	2-3	L	2-3
100/0.64 MBHJ					X	3[12]	X	3[12]	X	3	X	3
200/0.64 MB										4		4
200/0.64 MBHJSJ										4[12]		4
400/0.64 MB										4		4
400/0.64 MBHJSJ										4[12]		4

	P5 pit		P5 pit with collar		P6 pit		P8 Pit or P6 pit with collar or concrete 8 pit		P9 Pit or concrete 9 pit		Manhole	
Joint Type and sizes allowed in pit	HSJ S	In line 1-2	HSJ S-L-X	In line 1-2	HSJ S-L-X	In line 1-2-3	HSJ S-L-X	In line 1-2-3	HSJ S-L-X	In line 1-2-3	HSJ S-L-X	In line 1-2-3
10/0.90 MBHJ	S[12]	1[12]-2[12]	S	1[12] - 2[12]	S	1-2	S	1-2	S	1-2	S	1-2
30/0.90 MBHJ			X[12]		X[12]	2[12]-3[12]	X	2-3	X	2-3	X	2-3
50/0.90 MBHJ					X[12]	3[12]	X	3[12]	X	3	X	3

Notes

- HSJ = Heat Shrink Joint (HSJ) [S = Small, L = Large, X = Extra Large]
- In-line = In Line XAGA 550 joints [Type “1” = 43/8-100, Type “2” = 43/8-200, Type “3” = 75/15-250, Type “4” = 122/30-500] ,
- The type of in line joint to use is dependant on the cluster of cables to be jointed and the number and type of connectors. The chart only shows the indicative in line joint that would fit in the pit if the cable identified on the left of the chart were the largest cable to be installed and no other smaller combinations would exceed the bending requirements at that joint. The user should refer to Attachment 4B to determine the specific joint size.
- This information is only intended for new pits with new street distribution cables.
- Older style pit capacities and capacities for lead-ins can be found in work instruction 010255W03 & W04.

[1] To permit the use of the marked pits, for hard jacketed cables where there are no ant or termite problems, the hard jacket may be stripped to within 100mm of the pit entry to reduce the need for a larger pit.
[2] To permit the use of the marked pits, the cable joint must be placed diagonally within the pit to utilise a smaller pit

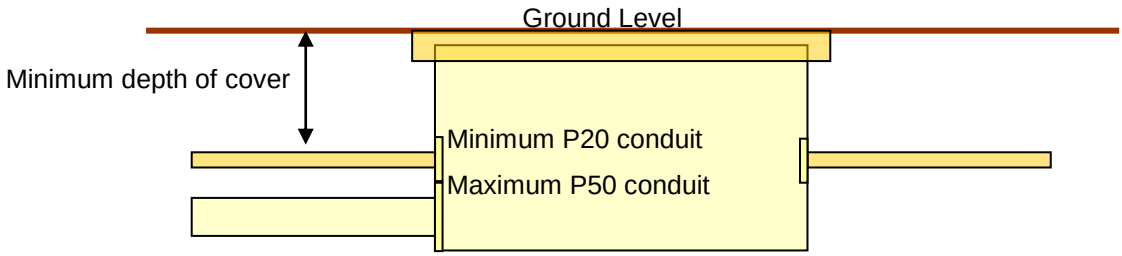
Table 6: Typical single joint to fit in a new pit or manhole for 0.64mm & 0.90mm filled cables

3.4. Pit & Conduit Combination Guide

3.4.1. "2" Pits

Use a P2 pit for:

- Lead-in purposes only
- Draining of lead-in conduit runs
- Lead-in transition or hauling pits (may coil up 2 or 5 pair cables for later service connection)
- Do not use to house in line joints or butt ended joints (except Utilux 2 or 5 pair enclosures)



Allowable conduit combinations at one end of the P2 pit		
P100 distribution or lead-in conduits at one end of the pit	**P50** distribution or lead-in conduits at one end of the pit	**P20** lead-in conduits at one end of the pit
0	1	4

Notes

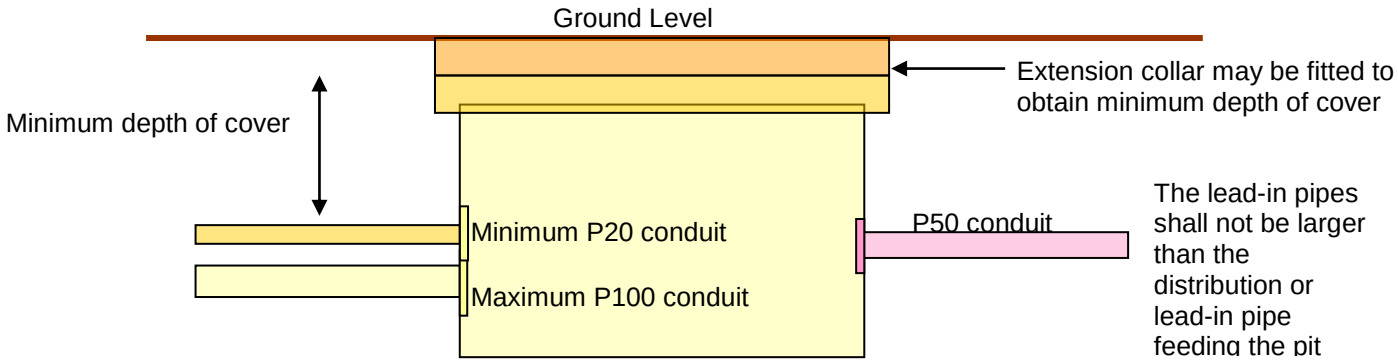
- The lead-in conduit shall not be larger than the feeding conduit.
- A P50 can be installed at one end and a P50 at the other.
- Conduits are only permitted to enter the pit ends

Figure 2: Typical pit & conduit combinations for a 2 pit (1 x P50 max.)

3.4.2. “5” Pits

Use a P5 pit for:

- Mains, Distribution or Lead-in purposes
- Intersection of conduit runs, change in size of conduits and to house joints



Allowable conduit combinations at one end of the P5 or P5 with collar pit		
P100 mains, distribution or lead-in conduits at one end of the pit	**P50** mains, distribution or lead-in conduits at one end of the pit	**P20** lead-in conduits at one end of the pit
1	2	0
1	1	2
1	0	4
0	3	0
0	2	2
0	1	4
0	0	4
0	0	8 see notes

Notes

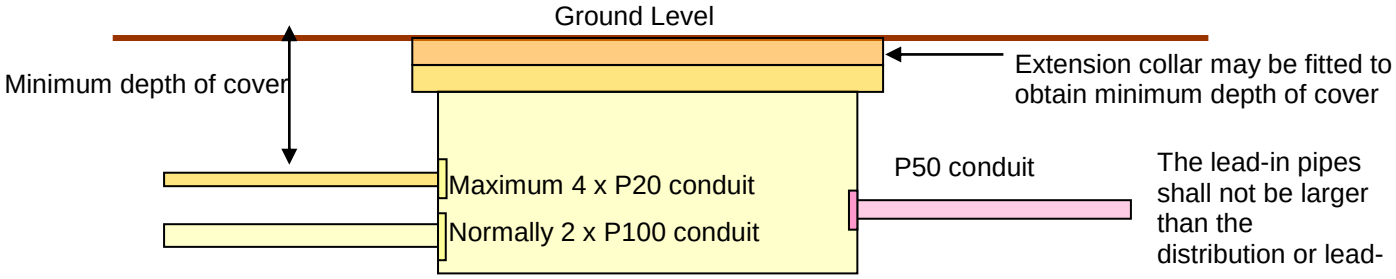
- The lead-in pipes shall not be larger than the distribution or main conduits feeding the pit.
- Conduits are only permitted to enter at pit ends.
- Even though a collar may be used to obtain extra depth, the number and size of joints required may still limit the number of lead-ins accessible from the pit. Validate with Telstra before considering any lead-in starter pipes from a pit end additional to those tabulated above.
- The collar is fitted on the pit when the depth of cover cannot be achieved. This is normally near the edge of a roadway where there is a sudden drop in height due to the kerb and gutter.
- Up to 8 lead-in conduits may be allowed where the pit is at the end of a conduit run within a dead end road and it is used to feed a cluster of residential premises that are located beyond the location of the pit
  Layout of conduits within the end of the pit must be a in a horizontal line of 4 with a horizontal line of up to 4 above and all at or below minimum depth of cover.

Figure 3: Typical pit & conduit combinations for a new P5 or P5 + collar pit (1 x P100 max.)

3.4.3. “6” & “8” Pits

Use a P6 or P8 for:-

- Mains and distribution purposes where there is no likely large size cable joint to be installed in the pit
- Intersection of conduit runs, change in size of conduits and to house joints
- Use a P8 (preferred) or P6 + collar when the depth of cover cannot be achieved. This is normally near the edge of a roadway where there is a sudden drop in height due to the kerb and channel.
- Use a concrete 8 pit only in special circumstances where a normal pit would not be able to exist in the extreme environment. A typical example is in highly reactive soils (eg. black soil) or in an area subject to high vibrations due to heavy vehicle movement in a sandy area.
- *More than 2 x P100’s per pit end are NOT permitted, even though physically possible in a P6 + collar or 8 pit due to potential for future joint installations.*



Allowable conduit combinations at one end of the P6, P6 + collar or P8 or concrete 8 pit		
P100 mains, distribution or lead-in conduits at one end of the pit	**P50** mains, distribution or lead-in conduits at one end of the pit	**P20** lead-in conduits at one end of the pit
2	0	0
1	2	0
1	0	4
0	4	0
0	2	2
0	1	4
0	0	4

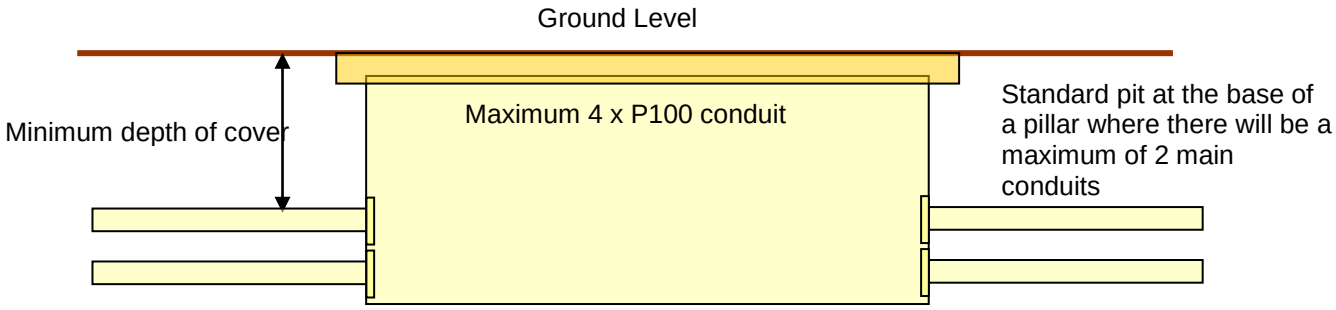
Notes

- The lead-in pipes shall not be larger than the distribution or main conduits feeding the pit.
- Conduits are only permitted to enter at pit ends.
- Even though a collar may be used to obtain extra depth, the number and size of joints required may still limit the number of lead-ins accessible from the pit. Validate with Telstra before considering any lead-in starter pipes from a pit end additional to those tabulated above.

Figure 4: Typical pit & conduit combinations for a new P6, P6 + collar or P8 or concrete 8 pit. (2 x P100 max.)

3.4.4. "9" Pits

- Use a P9 pit as the minimum pit size at the base of new pillars (Do not use a P8 or C8 or P6 with Collar). No more than 2 x 100mm conduits can be used for main cable purposes. The other conduits must be used for local distribution or lead-in purposes.
- Use a P 9 where the combined conduit configuration requires 3 or 4 x 100mm conduits at a pit end with **no more than 2 x 100mm conduits used for main cable purposes**. The other conduits must be used for local distribution or lead-in purposes.
- In situations where more than 2 x 100mm mains conduits are required use a manhole.
- Where a new 9 pit is installed at the base of a pillar or is to house an active device, an approved earthing kit shall be installed under the pit. (Refer to work instruction 010254W02)



Allowable conduit combinations at one end of the 9 pit		
P100 mains, distribution or lead-in conduits at one end of the pit	**P50** mains, distribution or lead-in conduits at one end of the pit	**P20** lead-in conduits at one end of the pit
4	0	0
3	2	0
3	0	4
2	4	0
2	2	4
1	4	4

* Note conduits are only permitted to enter at pit ends.

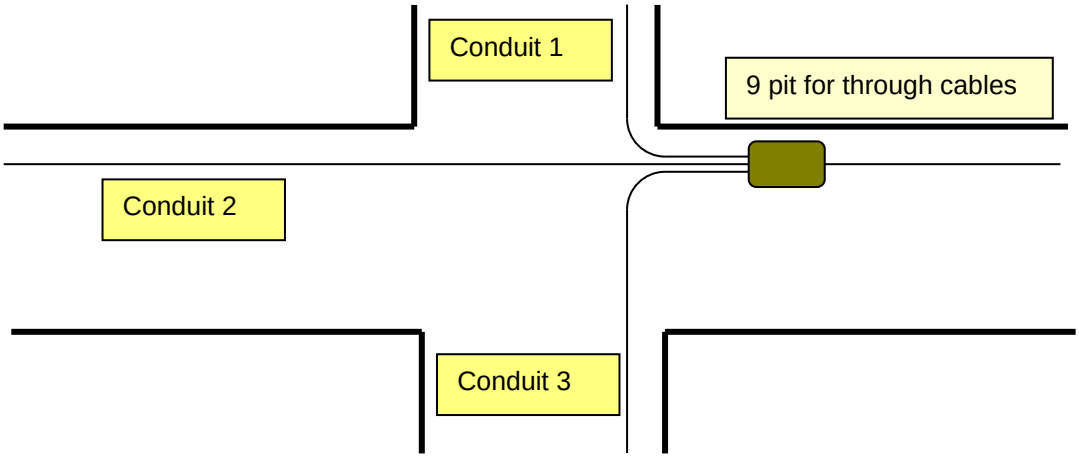


Figure 5: Typical pit & conduit combinations for a new 9 pit. (4 x P100 max.)

3.4.5. P9 Pit And P8 pit Combination for Interconnecting CMUX and Adjunct Housing.

By the use of P9 and P8 pits it is possible to interconnect CMUX and Adjunct housings without the need for a manhole.

Refer to Attachment ‘A’ for diagram of layout of pits.

3.5. New Joints

In an urban environment the most common type of joint used is a Heat Shrink Joint Refer to Attachments 4A for typical cable combinations in a HSJ.

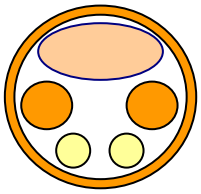
In a rural situation where the cables are direct buried an XAGA 550 in line joint can be used. Refer to Attachment 4B for typical cable combinations in an XAGA 550 joint.

3.5.1. Typical capacity of Heat Shrink Joints

3.5.1.1. Small Heat Shrink Joint (HSJ – S)

HSJ – S	1 x Main port		3 x A ports	
Conductor Diameter	Single Cable (non looped)	Single Cable (looped)	Single Cable	
	max - min	max - min	max - min	
0.40mm	50-10	50-10	30-02	max 5x2 pair
0.64mm	20-06	20-06	10-02	max 2x2 pair
0.90mm	10-06	10-06	02-02	max 1x 2 pair

3.5.1.2. Large Heat Shrink Joint (HSJ – L)

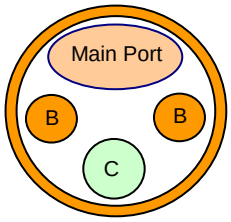


HSJ - L	1 x Main port		2 x A ports		2 x B ports
Conductor Diameter	Single Cable (non looped)	Single Cable (looped)	Single Cable		Single Cable
	max - min	max - min	max - min		max - min
0.40mm	100-70	100-10	30-02	max 5x2 pr	50-02
0.64mm	50-30	50-06	10-02	max 2x2 pr	20-02
0.90mm	20-20	20-06	02-02	max 1x2 pr	10-02

Note, "As part of the deployment of the 100 pair non-tapered philosophy for "Broad Acre" Residential New Estates a "B" port may be used (if cable diameter permits) for the insertion of a 100/0.40 cable.

3.5.1.3. Extra Large Heat Shrink Joint (HSJ – XL)

Base Cross



HSJ - XL	1 Main port		2 x B ports		1 x C ports
Conductor Diameter	Single Cable (non looped)	Single Cable (looped)	Single Cable		Single Cable
	max - min	max - min	max - min		max - min
0.40mm	N/A	N/A	50-02	max 5x2 pr	100-20
0.64mm	100-100	100-70	20-02	max 2x2 pr	100-06
0.90mm	100-50	100-30	10-02	max 2x2 pr	50-06

Note

- Use HSJ-S for cables 50/0.40 or less and HSJ-L for 100/0.40 or less
- The above sizes allow for both existing & new cable ranges
- No looping of cable allowed in the A, B or C ports
- Maximum of 2 cables allowed in the main port - new work (No 2 pair cables or earth lead-out wires to be installed in main port)
- For cutovers, 3 cables allowed in the main port (use cutover kits & HSJ-XL)
- Main port is oval not round, can affect cable sizes
- Ideally the "B" port should be left vacant for maintenance purposes
- Treat an earth wire as a 2 pair cable

3.5.2. Typical capacity of New In Line XAGA 550 Joints

In Line XAGA 550 joints

Type "**1**" = 43/8-100,
Type "**2**" = 43/8-200,
Type "**3**" = 75/15-250,
Type "**4**" = 122/30-500

43/8-100 means
43mm = Maximum Joint Bundle Diameter
(Key for calculations below)
8mm = Minimum Outside Cable Diameter
100mm = Length of Joint Opening

For smaller cables normally used as a direct buried joint in a rural situation and not installed in a pit, however where a tap out may be required later on, an in line joint may be installed in a pit

Used with 2, 3 or 4 cables per joint end (Not to include 2 & 5 pair lead-ins)

The designer may use the following filled "CPFUT" cable diameters for estimating pipe capacities as described above. (Add 1mm for each additional sheath additive, eg hard jacket, moisture barrier, sacrificial jacket and add 10mm for the spacing between cables for a branch clip).

Pair count for filled “CPFUT”cables	Approx. cable diameter for 0.40mm	Approx. cable diameter for 0.64mm	Approx. cable diameter for 0.90mm
2	4		
5	5	6	
10	10	14	17
30	13	19	26
50	16	24	33
100	22	32	
200	28	39	
400	38	51	
800	47		

Table 7: Approximate cable diameters

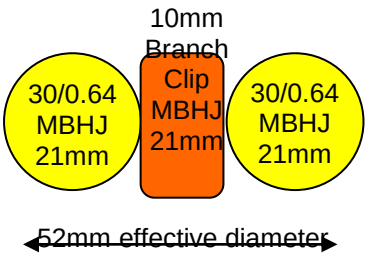


Figure 6: Example of Type 3 joint use

3.6. New Street Conduits

There are existing conduit dimensioning guidelines in place for new estates and augmentation. These are based on anticipated cable architectures and should be used in the majority of standard situations. These are:-

For new conduits in new estates, refer to 015526 A01

For new conduits in existing areas, refer to 015526 A08.

The over-ridding principle for any new conduit is that it will house new cable(s) and/or sub-duct(s) and not exceed the following limits.

The aggregated diameter of the new cable(s) and/or sub-duct(s) should not exceed 95% of the new conduits internal diameter.

The number of new cables and/or sub-ducts should be 6 or less

3.7. Depth Of Cover (Street/Lead-In)

Copper Cables		Urban Construction		Rural Construction
		P20 & P50	P100	
Within private property	**Minimum**	300 mm	300 mm	450 mm (where deep cultivation ploughing is not anticipated)
	Maximum	500 mm	500 mm	600 mm
	Preferred	300 mm	450 mm	500 mm
On public footway	**Minimum**	Where distance 2 m or less 300 mm		Where distance 2 m or less 450 mm
		Where distance exceeds 2 m 450 mm		Where distance exceeds 2 m 750 mm

Table 8: Depth of Cover (Street/Lead-In)

Note

In circumstances where trenching or ploughing would be extremely difficult due to rocky ground or other physical obstructions, part or all of the cabling may be installed in accordance with one of the following methods provided the cabling will not be susceptible to damage from environmental or physical sources:

- installation of the cable in galvanised iron pipe complying with AS 1074 chased into rock or secured to the surface of the ground and installed in such a way so as not to be hazardous to pedestrians or animals; (Subject to a risk assessment)
- Installation of the conduit or cable under a covering of at least 50 mm of fine aggregate concrete. (Subject to a risk assessment)

Any reticulation under private roadways (eg. townhouse/villa complexes, retirement villages, caravan parks, technology parks, etc.) shall have the same depth of cover as public roadways (ie. 650 mm under the invert and 450 mm under the kerb). Other reticulation within private complexes may be installed at a depth of 300 mm as such complexes do not generally have clearly defined footways.

4. REFERENCES

Document Number	Title
010254W02	Specifications for Installation of Jointing Pit
010255W03	Cable, Pit and Joint accommodation – New Work
010255W04	Cable, Pit and Joint accommodation – Old/Obsolete Pits
015526	Access Network Design
015526 A01	Pits & Conduits (Standard Urban Application)
015526 A08	Designers Application Guide (Infrastructure Upgrades)

5. DEFINITIONS

The following words, acronyms and abbreviations are referred to in this document.

Term	Definition
P2, P5, P6, P8, P9	Plastic pits of various sizes 2, 5, 6, 8, or 9
P20, P50, P100	PVC or PE (Plastic) conduits of a nominal 20, 50 or 100mm internal diameter See 015526

6. ATTACHMENTS

Document Number	Title
Attachment A	Interconnection of CMUX and Adjunct Housing.

7. DOCUMENT CONTROL SHEET

Contact for Enquiries and Proposed Changes

If you have any questions regarding this document contact:

Name: Internal Staff: Copper HFC; Contractors: Regional Contractor Manager

Designation:

Phone:

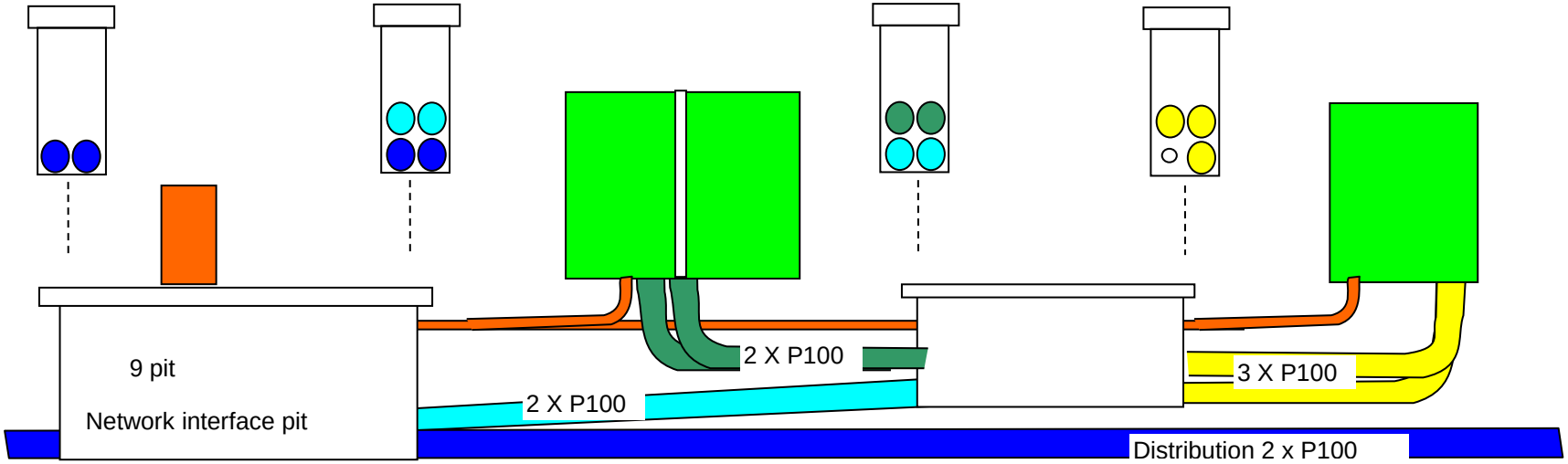
Fax:

If you have a suggestion for improving this document, complete and forward a copy of *Suggestions for Improvements to Documentation* (form 000 001-F01).

Record of Issues

Issue No	Issue Date	Nature of Amendment
1	14 September, 2000	
2	19 September, 2001	Review of 1st Issue
3 (v1)	13 February, 2002	Review of 2nd Issue
3 (V2)	28 March, 2002	Minor updates to tables to note link to Appendix 32 + earths for 9 pits
3 (V3)	10 May, 2002	Minor updates to tables to include JC9 pits + clarify use of JC9 in S3.4.4
4	18th April, 2003	Review of 3rd Issue
5	20th April, 2004	Annual Review – Release; replaces Appendix 19 Part 9
6	11th March, 2005	Annual Review – Draft 1
7	26th Oct, 2007	Review - Release

Attachment A



Use of a P8 pit between the housing removes the need for a “B” split manhole.

The CMUX must be installed on the network side of the Housing interface pit as it only requires 2 X P100 to feed the CMUX and allows 2 xP100 to connect to the distribution network.