

**010265W01 Cable Hauling and Duct  
Preparation - Cable Hauling**

** Telstra InfraCo**

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### Summary

This document outlines the practices for constructor staff involved in hauling of copper cables in Telstra InfraCo's network.

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## 01 Purpose

This document outlines the practices for constructor staff involved in hauling of copper cables in Telstra InfraCo's Customer Access Network. Certain performance standards are also mandated.

## 02 Scope

This document has been written for reference by Telstra employees and Telstra contractors. The term constructor refers to both Telstra employees and Telstra contractors.

This document supersedes and replaces all previous documents on this topic.

This document is subject to change. Before using it, please ensure you have the latest issue.

All material shall be approved by Telstra InfraCo.

## 03 Safety and Environment

### 3.1. Land Access

As a licensed telecommunications carrier, Telstra InfraCo has an obligation to comply fully with all relevant Commonwealth legislation, including the Telecommunications Act and its related regulations and instruments. Also, where applicable, Telstra InfraCo must comply with relevant State and Territory legislation.

Contractors engaged by Telstra InfraCo to undertake network facility activities, such as survey and inspection, maintenance which includes pit replacement on a like for like basis, and installation of low impact facilities such as pits/manholes, and who are under contract must comply fully with all relevant legislation. Contractors are also required to understand and comply with all Telstra's InfraCo policies and procedures relating to land access and environmental matters.

From time to time, Telstra InfraCo's network facilities may need to be relocated for various reasons. Where the facility relocation is at the request of another party (the "Disturber"), certain land access requirements must be satisfied before Telstra InfraCo will agree to the relocation of its facilities. This is to ensure that the relocated facilities retain full rights of tenure and accessibility at the new site or location.

It is the responsibility of all staff and contractors (including sub-contractors) to ensure that no harm comes to the environment via the activities carried out by them while acting on Telstra's behalf.

Please contact the Land Stewardship, Engagement and Compliance (LSEC) team if you have any further queries.

[InfraCo - Land Stewardship Engagement and Compliance](#)

### 3.2. Asbestos

All Telstra staff and contractors must follow the [Asbestos Risk Standard](#).

Prior to commencing any Asbestos related works in the Access Network, workers are to consider alternative construction methods that will avoid asbestos disturbance.

Cement pits do not contain asbestos if:

- They are labelled “NON-ACM” or
- They have been confirmed by a [competent person](#) able to identify asbestos as defined by WorkSafe Australia as not containing asbestos.

**Note:** ACM Ducts shall not enter any new/replacement pits or manholes. Refer to work instruction 010254W02 and 010254W06.

### 3.3. Fire Ants

To prevent the spread of fire ants, the Queensland Government has implemented movement controls in areas of Queensland where this pest species has been detected. These controls apply to individuals and commercial operators and restrict the movement of materials that could carry fire ants.

It is an offence if you do not comply with movement controls within fire ant biosecurity zones. Breaches of these controls can potentially impact the community, economy and the environment.

To help prevent the spread of fire ants, you should:

- Understand what fire ants look like and what materials (i.e. fire ant carriers) they might be moved in.
- Be aware if you are living or working in a fire ant biosecurity zone.
- Take all reasonable steps to ensure you do not spread fire ants.

More information can be found at the [National Fire Ant Eradication Program \(fireants.org.au\)](https://fireants.org.au) website.

### 3.4. Earth Potential Rise

Earth Potential Rise (EPR) is a condition where a fault on High Voltage power line causes a high current to flow through the associated earthing system, raising the voltage on the earthing system and surrounding soil with respect to a remote earth. This rise in voltage can be hazardous. It may occur at any time without warning at or near HV structures.

It is preferable to not install any new pits or manholes within an EPR zone, however, if a pit or manhole is to be installed within an ERP zone, they shall only be for hauling purposes i.e. no joints or equipment shall be installed in them. The pit or manhole installed within an EPR zone shall have an EPR Danger sign attached (material number 14800288) and be recorded as a SWL.

Refer to the 013926 series of documents for more details.

## 04 Hauling Preparations

Prior to installation of cables into the network, the conduits must be:

- Free of all obstructions.
- Rodded and proved with a suitable sized mandrel every time to ensure that the proposed cable, or series of cables, can be accommodated.

Cables must be fitted with an approved hauling rope when ready to be hauled.

Constructors shall follow the requirements of any hauling plans issued with a job unless directed otherwise by Telstra.

Hauling plans for each section should be issued for all hauling projects for cables 200/0.64mm and larger, and especially for LSFC (Large Sized Filled Cable) projects. The maximum hauling tension for each cable length is to be indicated on the plans.

## 05 Hauling

It is recommended that hauling small size cables be undertaken using a manual process, feeding and looping cable from pit to pit, avoiding unnecessary and excessive friction and tension on the cable. Appropriately placed hauling guides shall be installed, especially at pits where conduits are not at the same level.

The constructor must ensure that flexible conduits, hauling rollers or guides shall be placed in the correct position to protect the sheathing of cables at hauling-in points and at locations where cables leave the pipe run.

Where necessary, and especially for larger and heavier cable, the use of mechanical aides such as small motor driven winches is approved if used by qualified staff. For long lengths of filled cable, there may be a need to spread the load between the conductors by installing a hauling eye. Under no circumstances should cable hauling processes exceed the hauling tension limits set down in the manufacturer's specification.

## 06 Hauling Practices

The following practices are to be applied:

- Ensure that the hauling rope and attached cable is not threaded through any existing cable loops or manhole ladders.
- Haul cable/s in the pulling direction which minimises cable tensions wherever practicable, consistent with limitations caused by obstructions, restrictions and hauling length.
- Provide cable guides at the manhole/pit entry and exit points, conduit entry and exit points and in all jointing chambers where changes of direction occur (including where conduits are misaligned).
- Continually monitor all pit and manhole locations throughout the haul to ensure that existing cables do not move during the hauling operation or are damaged by the hauling rope or other apparatus.
- Apply an even tension and avoid stopping and starting wherever possible.

- A hauling speed of approximately 30m per minute is desirable to prevent surging and to reduce tension.
- Cables are not to be hauled in excess of the recommended hauling tension.
- All cables are to be hauled into conduits by use of the approved hauling rope.
- All large size cables are to be installed using a winch fitted with a tension measuring device.
- Cable hauling lubricant (Material No.09100030 or 09100031) should be used when hauling cable into occupied ducts, for long and difficult hauls where the calculated dry duct hauling tension is nearing the maximum allowable for the cable, and when hauling into misaligned ducts.
- Large sized cables (200 pair and greater) must be fitted with an approved metal hauling eye, to reduce the possibility of cable damage.
- Cable hauling grips, where used on small size cables, must be used in a manner that does not damage the cable or existing plant. End Caps should be fitted to cables prior to hauling and all cables left in situ before jointing. Refer to Section 016.
- As specified in the network design, the appropriate amount of slack cable should be drawn into intermediate and end pits/manholes, for housing and jointing requirements (see Figure 3 and Figure 4).
- Unless otherwise agreed with Telstra InfraCo, where a cable is not tapered at a proposed joint location, the cable shall be hauled uncut through the pit or manhole, and then carefully pulled back and formed as per Section 013.
- When overhauling other cables, and particularly optical fibre cable, haul to the lowest of the maximum hauling tension of the existing cables in the conduit. To assist limiting the hauling tension, a mechanical fuse or other form of tension limiting device, rated at the lowest maximum hauling tension of the cables, shall be used when overhauling cable.
- The maximum sized copper cable which can be hauled over any bare (not in subduct) optical fibre cable, is to be limited to 50/0.90, 100/0.64 or 200/0.40mm cable. The hauling tension applied to the new cable when overhauling a bare optical fibre cable must not exceed 2kN.
- Do not haul over air-tubing. Air-tube should be relocated (temporarily or permanently) prior to cable installation.



## 07 Cable Hauling Tensions

Cable Size	Max. Hauling Tension
200/0.40	4.8 KN
400/0.40	9.6 KN
800/0.40	19.2 KN
1200/0.40	28.8 KN
2400/0.40	40.0 KN
200/0.64	12.3 KN
400/0.64	24.6 KN

*Table 1 - Large sized cable hauling tensions*

**Note:** The hauling tension of smaller existing copper cables, when applicable, will also need to be determined prior to them being overhauled.

## 08 Large Sized Cable Hauling guidelines

This is to apply to all planners, designers and constructors involved in installing copper main cables. Large size cable is deemed to be 200 pairs or greater.

For large size cables, designers need to calculate the maximum length of cable that can be hauled in a conduit. This is important so not to exceed the maximum hauling tension. If this is not done there is a danger of either damaging the cable itself or any of the other cables that may be in the conduit as well as significantly delaying the project.

### 8.1. Conduit is Vacant

Hauling into a vacant conduit can proceed provided that the conduit has been previously mandrelled and roped. Refer to Work Instruction 010265W02.

### 8.2. Conduit Contains Other Main Copper Cables

Hauling crews should prove condition of ducts prior to any hauling.

**Example:** A 100mm conduit that already has 2 x 100/0.40 (2 x 24mm = 48mm). A 200/0.40 is to be overhauled for 250m. The diameters of the cable are in the Table 2.

Cable type	Diameter of cable	No. of cables	Added diameters
100/0.40	24mm	2	48mm
200/0.40	26mm	1	26mm
<b>Total</b>			<b>74mm</b>

*Table 2 - Cable diameter calculation example*

In this case the added diameters are less than the size of the conduit (100mm) so we can proceed.

However, note that overhauling a cable with a larger cable could easily damage the smaller cable if:

- the maximum tension is exceeded (compare maximum sectional hauling tension of the new cable to the noted hauling tension of the smaller cable).
- the hauling rope or new cable tangles and gathers existing cables.

### 8.3. Hazard Notifications

When hauling in the presence of or overhauling optical fibre or other cables, constructors shall submit hazard notifications via CMART (Change Management and Reporting Tool), or other Telstra reporting systems as applicable.

### 8.4. Hauling Detail Sheet

The following requirements are to be clearly displayed on a Hauling Detail sheet.

Refer to Section 017 for any project which either installs new or hauls over existing air-core cable. The following details should be completed and forwarded to the regional CPAS contractor 24 hours before hauling commences:

- Constructor name and on-site supervisor's contact point, exchange name, DA, cable number and pair range of existing and new cables, location, duration of haul, work order number and current air pressure of existing cables to be overhauled.
- A copy of the hauling detail sheet must be on site when work is in progress. The remaining details should be completed and included with the "as built" file returned to Telstra upon completion of the project.
- Confirm that all air-core cables have been tested both prior to and after hauling to ensure they maintain air pressure.

**Note:** All as-builts shall be loaded into Telstra InfraCo's network inventory systems within 2 months of the completion of the build.

### 8.5. Conduit Containing Optic Fibre Cable

If the conduit contains optical fibre, the maximum size copper cable to be hauled over any "bare" (not in subduct) optical fibre cable sheath(s) is limited to 200/0.40 or 100/0.64 or 50/0.90, and it is to be installed using a hauling fuse rated at the lowest hauling tension for optical fibre cables.

Refer to Work Instruction 010265W05 for Overhauling of Optical Fibre Cables Requirements.

#### 8.5.1. Design and Installation Considerations

Responsibilities of Designers and Field Supervisors

When hauling over existing cables the maximum hauling tension **for the existing cables** will determine the maximum hauling tension for the new cable being installed.

When overhauling bare or sub ducted optic fibre cable, use a mechanical hauling fuse rated at the lowest optic fibre cable hauling tension, or use an equivalent tension limiting device (pressure gauge on hydraulic operated winch trucks or dynamometer).

**Note:** Do not exceed 2 kN

Hauling of other cables over existing optical fibre cables is permitted, but only under the following conditions:

- The maximum sized copper cable that can be hauled over any 'bare' optical fibre cable (i.e. not in subduct) is 200/0.40 or 100/0.64 or 50/0.90.
- The maximum hauling tension shall be limited to the lowest hauling tension of any existing cable in the conduit.
- When overhauling, all good engineering practices should be followed. With any cable there will always be a need to have sufficient space available within the duct or pipe to satisfactorily overhaul the additional cable.
- Where it is not obvious that sufficient space exists, the conduit must be proved with a mandrel 1.5 times the size of the cable prior to attempting any overhauling. If this is successful and it can be reasonably assumed there will be no damage to any cables, subducts or infrastructure, proceed with the haul.
- If at any stage the proving of the conduit becomes difficult or the conduit cannot be proven and there is a possibility of cable damage, seek an alternate solution. Once all sections of the proposed haul have been proven then determine hauling tensions and lay off points if required.
- Existing optical fibre cables must be restrained from moving in the same direction as the haul.
- During hauling, supervision must be provided at entry, exit and change of direction locations.

## 8.6. Conduit Contains Distribution Cables

Do not overhaul any new large size cable (200/0.40 or greater) if:

- There are more than 2 existing distribution cables or
- The size of the cable(s) is less than 50 pair.

To use a conduit that fails the above, it will be necessary to either temporarily or permanently relocate the existing cable(s) before any main cable is hauled within the duct.

## 8.7. New Pits & Manholes Spacing

For rodding & roping purposes the following apply:

- The maximum spacing between new manholes is 250m.
- The maximum spacing between new size 6 pits, or larger, is 100m.
- The maximum spacing between new size 5 pits, is 50m.

## 09 Ropes & Attachments

Cables larger than 25mm OD (outside diameter) are to be hauled using Steel Wire Rope (SWR) or Wire Rope Core (WRC) hauling ropes, attached to a cable hauling winch fitted with a tension measuring device. The hauling rope must be in good condition.

Cables up to and including 25mm OD can be installed using polypropylene rope (Material No. 67500294). This can be hand hauled.

If the conduit is occupied, then Spectra rope (Static / low elongation) should be used.

All large size cable hauling ropes are to be fitted with a suitable swivel between the rope and the hauling eye.

Where cables are not fitted with hauling eyes (small sized cables), the appropriate sized wire cable grips should be used. For large sized cable it is preferred that a factory fitted hauling eye is used.

## 010 Cable Grips

Material Number	Grip Size	Grip Type	Mesh Ply	Cable Diam. (mm)
11400001	00	Fixed	Single	6 to 13
11400002	0	Slip	Double	12 to 19
11400003	1	Slip	Double	19 to 32
11400004	2	Slip	Double	25 to 38
11400005	3	Slip	Double	31 to 45
11400006	4	Slip	Double	38 to 64
11400007	5	Slip	Double	44 to 83

*Table 3 - Cable grip size and type*

## 011 Position of Equipment for Direct Cable Feed

The following shows the position of the equipment for direct cable feeding.

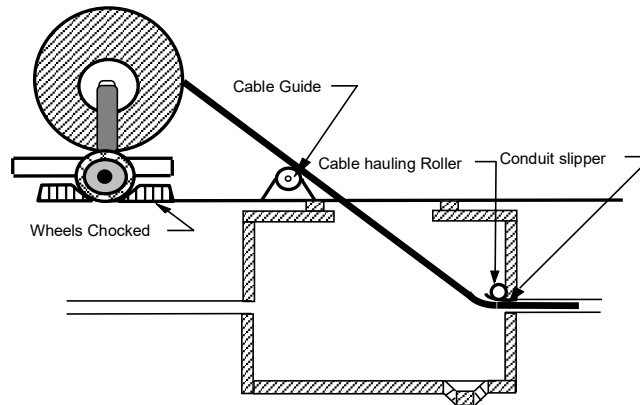


Figure 1 - Direct feed hauling

## 012 Position of Feeder and Trailer - Indirect Feed

The following shows the position of the equipment for indirect cable feeding.

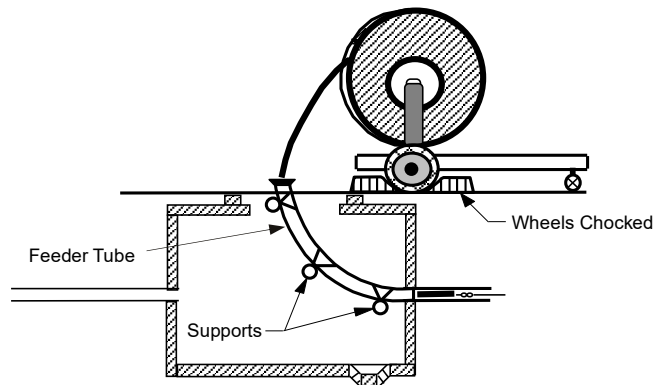


Figure 2 - Indirect feed hauling

## 013 Lay-up of Cable at Joint Locations

### 13.1. Lay-up for Housing of Openable Joints in Pits

When measuring out and hauling distribution cable, the constructor is to use only sufficient distribution cable to allow for jointing and orderly cable flow within pits.

The constructor is not to leave cables looped in intermediate pits unless a joint will be required in the future.

The constructor is to leave sufficient lead-in cable (2-5/0.40 PEIFLI) coiled up in the lead-in pit when the distribution joint is made, to extend to the nominated premises without another joint.

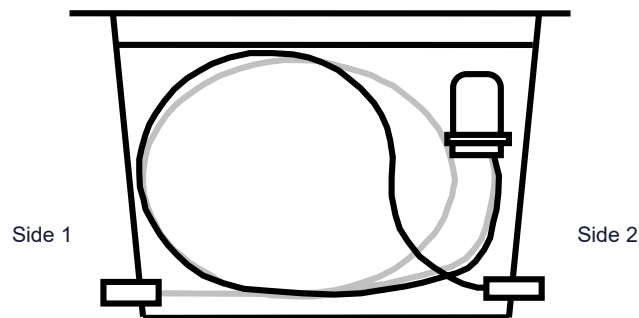


Figure 3 - Cable set up for openable joints in pits

PIT	SIDE ONE	SIDE TWO
J2/P2	2.7 m	2.2 m
J3/P3	3.0 m	2.4 m
J4/P4	3.2 m	2.6 m
P5	3.2 m	2.6 m
H6/P6	5.5 m	4.0 m
H8/P8	7.0 m	5.5 m

Table 4 - Cable length requirements for single ended joints

## 13.2. Lay-up for Housing of In-line Closures in Pits

The following shows the how to lay-up the copper cable to be housed in size 6 pits, or larger.

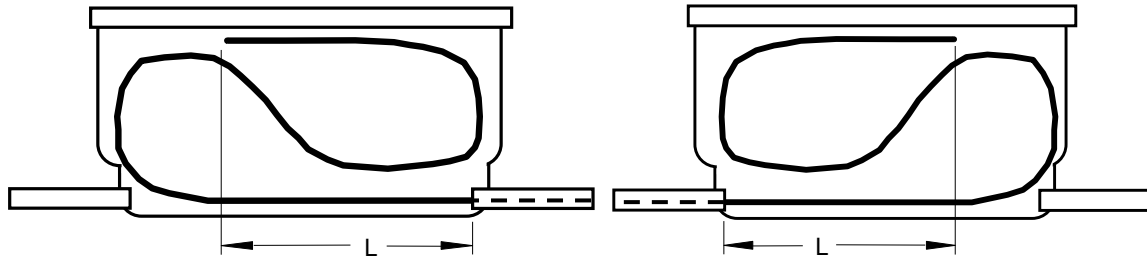


Figure 4 - Cable set up for in-line enclosures

Pit Size	Cable Length (L) – each side
P5	3 metres
H6/P6	4.5 metres
H8/P6 + collar/P8	5.7 metres
H9/P9	7.2 metres

L is measured from the conduit entry to the end of the housed cable

Table 5 - Cable requirements for in line joints in pits

## 13.3. Lay-up for Housing of Openable Joints in Manholes

For manholes, install sufficient cable so that the joint can be installed upright at one end of the manhole and the cable(s) can be formed into a minimum of 1.5 loops against the side wall.

The cable shall be formed into loops and housed without any kinking of the cable sheath.

# 014 Lead-in Cable Installation

## 14.1. Lead-in Cable Hauling and Housing

It is recommended that all backbone cable hauling be completed before commencing lead-in cable hauling.

**Note:** Do not leave slack lead-in cable in the intermediate pits.

- Consult the job plan and install the lead-in cables as specified on the plan.
- Coil the lead-in cables and leave in their respective property pit.
- The lead-in cable left in the pit outside each respective property shall be long enough to reach the proposed location of the Network Termination Device (NTD).
- All cable ends are to be properly sealed using approved practices.

**Note:** After hauling in of the lead-in, the conduit shall be sealed at both ends. Refer to 010260W01.

## 015 Labelling of lead-in cables

Lead-in cables shall be labelled as detailed in Work Instruction 010257W06.

## 016 Sealing Cable Ends

All cable ends are to be sealed to prevent moisture ingress. Heat shrink tube end caps are used to seal the following:

- All cables not fitted with a hauling eye prior to hauling.
- Cable lengths left in situ before jointing.
- Cable stubs from joints.
- Cable made spare after re-arrangements but left in situ.
- Cable on drums.

### 16.1. Capping of Cable

Lead-in cable that is not to be immediately terminated in a joint, connection box/NTD or distributor shall be capped using a heat shrink tube end cap. For 2/0.40 PE or 5/0.40 PE cable, use end cap Material No.43300095.



Figure 5 - 2/5 pair end cap shrinking

For other cables, remove the nylon jacket if applicable (HJ cables only), measure the outside diameter of the PE cable sheath to be capped, and select the appropriate end cap in accordance with Table 6 and Table 7.

Outside Diameter of Cable		End Cap Required
Minimum	Maximum	Material Number
4	10	43300239
7.5	16	43300240
15	30	43300241
25	50	43300242
70	90	43300193

**Note:** For 2/0.40 PE or 5/0.40 PE cable use end cap Material No.43300095.

Table 6 - Cable end cap selection (no air valve)

Material Number	Description
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43300194	End Cap, Thermo-Shrink, 15-25mm with valve
43300195	End Cap, Thermo-Shrink, 24-43mm with valve
43300196	End Cap, Thermo-Shrink, 40-70mm with valve
43300197	End Cap, Thermo-Shrink, 70-90mm with valve

Table 7 - Cable end cap selection (with air valve)

### 16.1.1. Cable Preparation and Fitting of End Cap

The cable shall be prepared and capped as follows:

- Cut the end of the cable square.
- Remove the nylon jacket from the end of any HJ cable to be sealed.
- Clean the cable sheath with solvent pad (Material No.43300264). Avoid skin contact with solvent — wear plastic mittens (Material No.43300265).
- Abrade the cable circumferentially using #80 grit emery tape (similar to the emery tape supplied in some joint kits).



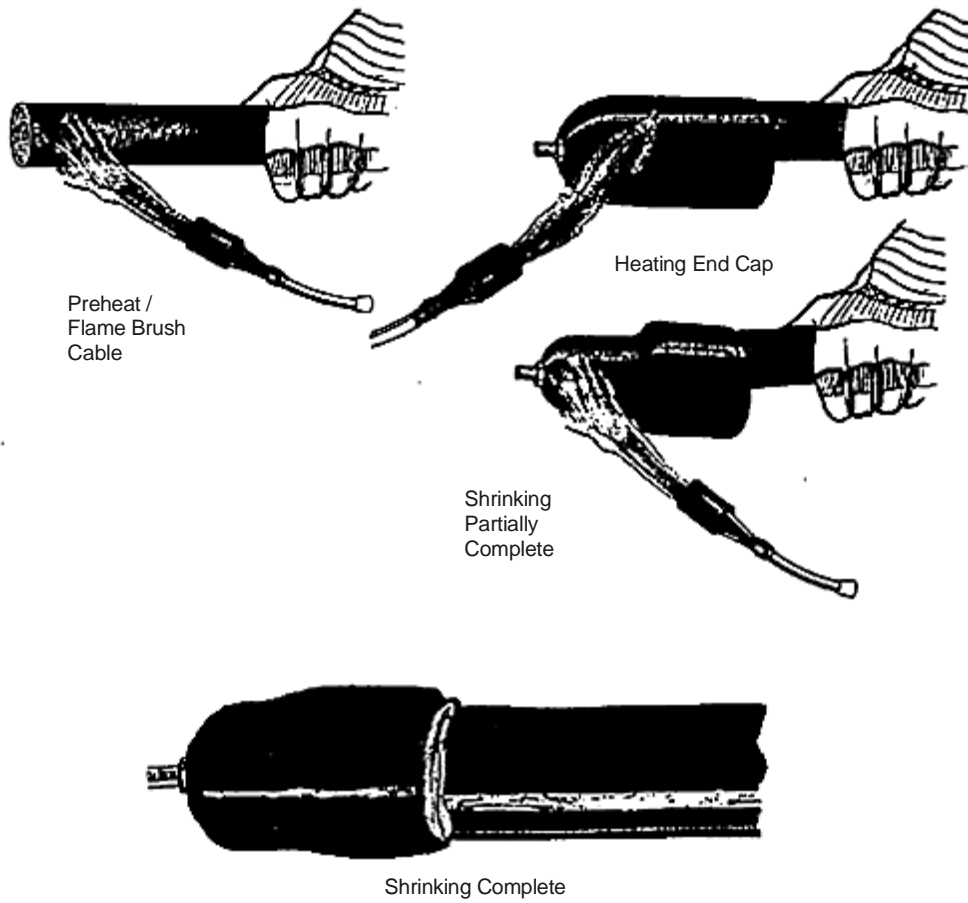
Figure 6 - Cleaning and abrading cable sheath

- Using a soft flame burner, flame brush the abraded area.
- For lead- sheath cable preheat the cleaned abraded area.

**Note:** Refer to the [Lead Management](#) standard for safe work practices.

**Note:** Remove the valve core of end caps with valve fitted before shrinking.


- Insert the cable in the end cap to the full depth of the cap. Press the closed end of the cap against a suitable stop to prevent the cap slipping off the end of the cable during the shrinking operation.
- Applying a soft flame burner, apply heat uniformly around the end cap to shrink it. Work from the closed end towards the open end of the cap.
- Do not apply excessive heat.
- Cease heating when the cap has fully closed down on the cable. If the end cap is lined with adhesive, some adhesive will appear at the open end as the cap shrinks down (this is ok)
- Hold the capped cable against the stop until the cap has cooled enough to hold its position.



*Figure 7 - Heating and shrinking end cap*

- When cool and if fitted with an air valve tighten the tension nut on the valve.
- Replace the valve core in the stem and re-pressurise the cable with dry air.

## 017 Hauling detail sheet

 <b>InfraCo</b>			<b>HAULING DETAIL SHEET</b>			Constructor Name: _____			Sheet ____ of ____	
Exchange:			Project Address:			Supervisor:				
DA/CCP:			Work Order No:			CID No:		Phone:		
Identify section/s to be hauled:						Start date:		Completion date:		
New Cable						Existing Cable(s)				
Distance Hauled	Cable Size	Air Or Filled	Cable No.	Pressure After Haul	Pressure 24 Hrs After Haul	Existing Cable Number	Pressure Prior To Haul	Pressure After Haul	Pressure 24 Hrs After Haul	

**Note:** Greyed areas to be completed and sent electronically to the CPAS Regional Monitoring Centre 24 hrs prior to hauling.  
 For assistance when completing this form or to obtain monitoring centre e-mail addresses call the National CPAS Information number 1300 556 727

## 018 References

Document number	Title
010256W02	Cable Hauling and Duct Preparation – Rodding, Roping and Proving
010256W05	Cable Hauling and Duct Preparation –Over Hauling of Optical fibre Cable
010257W06	Tags and Labelling

## 019 Definitions

Term	Definition
CPAS	Cable Pressure Alarm System
DA	Distribution Area
HJ	Hard Jacket
NTD	Network Termination Device
PE	Polyethylene

## 020 Attachments

Document number	Title
Nil	

General

## 021 Document control sheet

This document has been formally approved by the person identified below:

Approver Name	Leader, Warren
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If you have a suggestion for improving this document, please contact the people listed above.

## 022 Record of Issue

Issue num'	Issue date	Details on the change
1	26 March 1999	First Issue See Section 19 for Issue No's 2-7
2	April 21 1999	Tables on cable lengths in pits changed to agree with Appendix 32 Part 2
3	August 16 1999	P5 pit added to Fig. 4
4	December 8 1999	Cable hauling and housing for SDAN added.
5	January 6 2000	Comments included. SDN changed to SDAN. Extra hauling considerations.
6	January 25 2000	Cable Hauling Guidelines added
7	February 14 2000	Para. 12.2 –“Lay up for Housing of HSOJ's in Manholes” added.
8	10 December 2003	Sealing cable ends added
9	1 May 2001	Section 5 DP 13 – Ref. to loop removed Ref. to sect. 13 added
10	30 July 2001	Section 8 Polypropylene Rope (Blue/Yellow) <b>HAND HAUL ONLY</b> added.
11	30 August 2001	Section 7.2.1 – Hauling detail sheet text and Attachment 1 added
12	2 August 2002	Document Type name change to Technical Standard.
13	24 November 2003	Section 16 – Attachment 1 updated to include CID Number and the National CPAS Information phone number - New Template 8.6.8

General

Issue num'	Issue date	Details on the change
14	28 July 2004	New Telstra Document Number - replaces Appendix 52 Part 1 Document placed in new template 8.6.8
15	21 March 2005	Section 5 Hauling Practices - dot point removed "Where the proposed cable is 200/0.40 or greater, a straight haul should generally not exceed 300m unless directed otherwise."
15a (See EDMS Previous Versions)	11 September 2014	Reviewed and Updated version of Issue 14
16	31 July 2015	Contents reviewed and new template applied to Issue 15. Serial/Item Numbers replaced with Material Numbers. References to "Haulit" and "SDAN / SAM" removed. Added Section 8.3 on hazard notifications.
17	17 October 2023	New template. Section 6 – added point that rope, and cables are not to be threaded through loops or ladders. Section 8.3 – Removed reference to APEC system. Section 8.7 – Added maximum spacing between new size 5 pits is 50m. Section 14.1 – Updated length of lead-in cable left in pit requirement. -Added note to seal LIC after cable installation.
18	14 May 2024	New template Section 3.3 – Remove incorrect phone number. Section 6 – dot point 15 – changed use of mechanical fuse, etc from "can be used" to "shall be used". Section 8.5.1 – New section moved from 010265W05. Other minor changes to sentences to improved clarity.

## General