

Underground Network Earthing

HFC Network Specification 005673



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Summary

Earthing practices for ground based HFC external plant.

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01 Purpose

This document describes earthing requirements for broadband network components installed in underground housings and in pedestals.

Underground Broadband network requires earthing for two purposes:

1. As a component of the 240v wiring installation associated with single insulated Line Power Supplies.
2. Regular (Frequent) earthing of the Broadband Network to minimise the possibility of potential differences developing between broadband network cables and device housings and their surrounding (earthed) environment.

02 Scope

This document applies to network installed underground and in pedestals. Earthing requirements for aerial network are detailed in 005627.

The requirements of this document are intended to comply with ACIF C524, Industry Code- External Communication Cable Networks. All activities on network constructed after 31 December 1998 must comply with this code.

03 Underground Network Earthing

3.1. Earthing via LPS Connections

At each single insulated LPS installation, the broadband network is bonded to the electricity supply Multiple Earthed Neutral conductor as a result of making the supply connection in accordance with Supply Authority requirements.

3.2. Intermediate Earthing Points

To minimise the possibility (and magnitude) of potential differences between network and local earth, intermediate earths are to be installed at points between LPS installations.

3.3. Frequency of Intermediate Earths

An earth should be installed at every active device location. Where the spacing between active devices is greater than 500m, an earth is to be installed at an intermediate passive device.

Note that earthing is not required specifically for the active device itself. The occurrence of active devices is a guide to the frequency/location of network earths, and the device housing offers a convenient point of attachment for earth conductors.

Where two or more active devices are located in the same pit, manhole or pedestal, one earth connected to one of the devices is sufficient.

3.4. Resistance of Earthing System

No specific resistance value need be achieved for a broadband earth, and measurement of resistance is not required.

3.5. Electrodes for Broadband Earthing

Two types of earth electrodes are acceptable for broadband earthing:

1. driven rod(s)
2. installed strap(s)

Selection of the type of electrode may be determined by referring to the flowchart in Figure 3.5-1. Either type of electrode is acceptable in all cases, but the strap is preferred due to elimination of risk associated with driving rods.

Note: It is not acceptable to obtain an earth by making any connection to the telecommunications network.

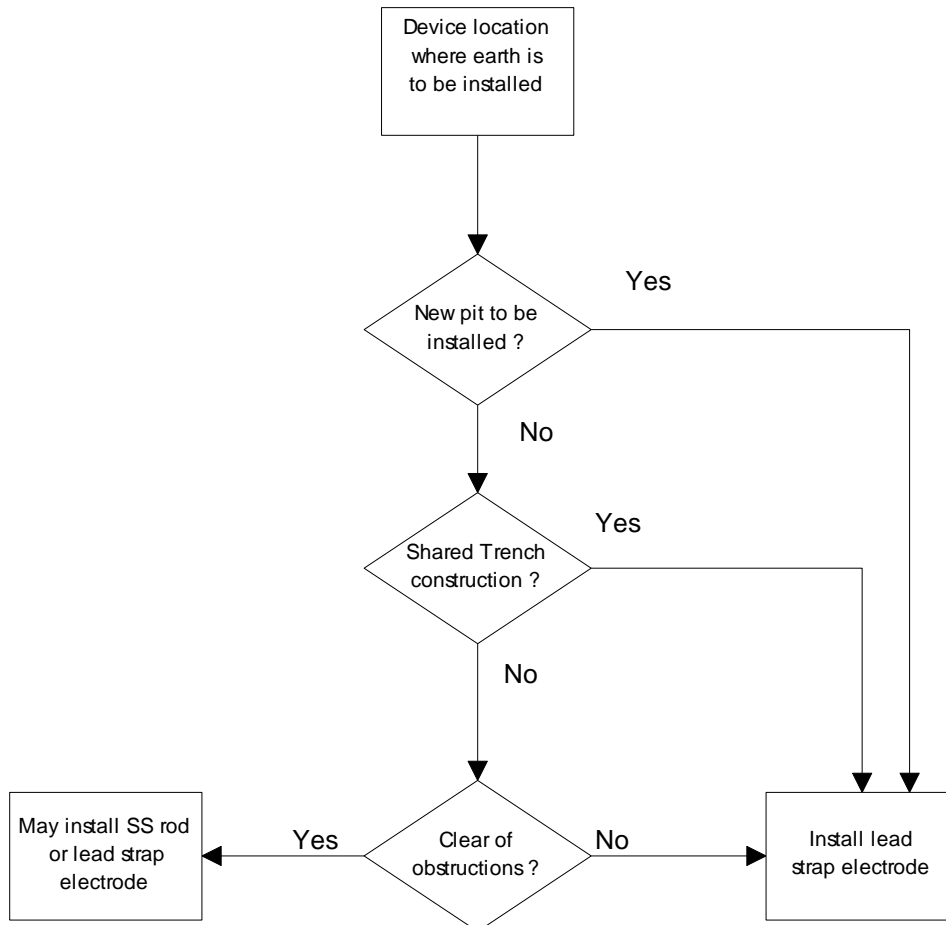


Figure3.5-1. Flowchart for Selection of Earth Electrode Type

3.6. Electrical System Earthing at Line Power Supplies

Refer to 005 704, "Electrical Standards for Broadband Line Power Supply Installations" for further details. Only non-double insulated LPS only require earthing. Double insulated LPS, eg FRPD models, must not be earthed.

3.7. Earth Installation

3.7.1. Earth Potential Rise Zones

Earth electrodes must not be installed in areas subject to earth potential rise. Refer to 005623, Housing Broadband Cables and Devices in Pits and Manholes for details.

3.7.2. Earth Rod

CAUTION: Check for power and communication cables, gas and water pipes, and any other buried structures before driving earth rods.

Drive the rod through the base of the manhole or pit. Alternatively, install an auxiliary P2 pit to accommodate the earth rod adjacent to the manhole or pit in which the housing is to be installed. A P35

(minimum) conduit is required between the P2 pit and the manhole or pit in which the active device is to be installed.

Install a stainless steel clad rod (Serial 446/16), through the base of the pit/manhole, using a driving point (Serial 446/13) and driving head (Serial 446/14) on the rod. Only one rod is required. Manual driving of the rod with a hammer is strongly recommended as it allows greater operator "feel" of driving progress, and whether the rod has encountered an obstruction.

Leave 240mm of the top of the rod exposed in the pit to allow connection of the earth lead.

3.7.3. Connection of Earth Conductor to Earth Rod

1. Use Terminating Head (S446/18)
2. Use 7/1.04, Green/Yellow PVC insulated, cable (S192/487) as the earth conductor.
3. Strip 40mm of insulation from the end of the earthing conductor. Unravel **one only** strand of the conductor, and cut the remaining six (**6**) strands back to 20mm long (from the end of the insulation). Double back the single long strand to create a 20mm long conductor bundle of eight (**8**) strands.
4. Insert the bundle of eight (**8**) conductors into one side of the terminating head and apply two crimps at right angles to each other with Crimping Tool (92/52).
5. Apply Denso tape over the whole terminating head.

An alternative method of termination is to use a brass earth clip (S425/22) covered with Denso tape.

3.7.4. Strap Earth

The Broadband Earthing Kit (S740/81) is specially prepared for broadband use, and comprises a 1500mm x 50mm x 3mm thick lead strap with integral 6mm² insulated copper earth conductor. The lead strap earth is best installed horizontally beneath a pit or pedestal or in an adjacent trench. It should be laid as deep as possible. No special backfill is required for lead strap earths in this application although dampening and compaction of the backfill soil will achieve best results. When installed beneath a pit, approximately 100 mm of backfill should be provided between the bottom of the pit and the strap. Drill an 8mm hole in the base of the pit in the location shown, and bring the earth conductor into the pit through it.

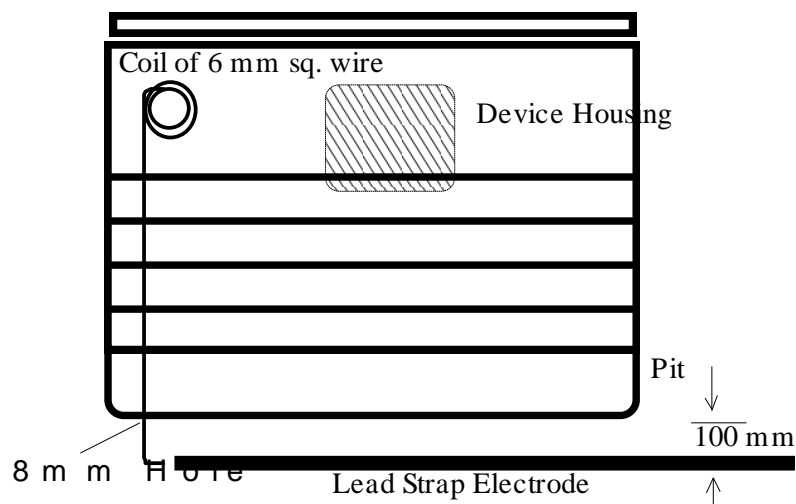


Figure 3.7-1. Installation of Lead Strap Electrode Under a Pit

3.7.5. Installation of a Strap Earth Adjacent to an Existing Pit/Manholes

Where the strap earth is to be installed next to an existing pit/manhole, excavate a trench 300mm deep and at least 50mm wide, parallel to and 100mm away from the pit. Excavate across to the pit wall and drill an 8mm hole through the wall of the pit to accommodate the conductor.

Unroll the earth strap and lay it in the trench. Pass the conductor through the hole in the pit wall. Back fill and compact the trench.

3.7.6. Connection of Earth Conductor to Device Housings

The earth conductor is to be located on the pit/manhole wall or pedestal frame so that it does not obstruct access to cables and devices. The conductor may be secured in place with cable ties. Cut the conductor to length: do not coil the earth conductor.

To connect the 6mm², green/yellow, earth conductor onto the broadband active device housing, strip 30mm of insulation from the end and crimp on a suitable lug. (eg, Cable Accessories Aust. P/L - Part No. CAL 6-8 or similar). Bolt the cable lug to the housing using one of the mounting bolts so that the earth lug is between the bolt head and the device mounting bracket.

3.7.7. Labelling the Broadband Earth Conductor

The Broadband Earth Conductor must be labelled using Earth Conductor Labelling Tape (S740/95). The tape is YELLOW with BLACK lettering "CATV EARTH ONLY". The tape is to be placed around the earth conductor close to the connection point on the mounting bolt of the broadband device so it is clearly visible. Apply the tape to the earth conductor at the connection point to an earth stake where the earth stake has been installed in a separate P2 pit.

3.8. Maintenance of Earth Installation

Visual inspection of an earth conductor and connection to network devices should be adequate to determine satisfactory condition of the installation.

Where an earth is to be disconnected, eg due to network, pit or pedestal alterations, care should be taken as a potential difference may exist between the network (device housing / cable) and the earth conductor.

When disconnecting an earth conductor, ensure that body parts do not bridge the opened earth conductor and conductive network. LV insulated tools and gloves should be utilized.

Where a potential difference is suspected or found, measurement should be undertaken to confirm magnitude of the hazard using a meter with insulated probes or a proximity voltage detector. A potential difference >32Vac must be flagged as hazardous and investigated.

As part of any network pit or pedestal alteration an earth installation must be reinstated as described in Paragraph 3.7 as part the alteration.

04 References

Document number	Title
TPH 0045LC	Distribution Cable Jointing and Lead-ins
005701	Broadband Line Power Supply Provisioning Procedures
005702	Siting Criteria and Point of Supply Guidelines for Broadband Line Power Supplies
005703	Mounting Practices for Broadband Line Power Supply Installations
005704	Electrical Standards for Broadband Line Power Supply Installations
ACIF C524	Industry Code- External Communication Cable Networks

05 Definitions

Term	Definition
Active Device	A device installed in the Broadband Network that requires 48v AC power for its operation
Passive Device	A device installed in the Broadband Network that does not require 48v AC power for its operation
Optical Hub	An active device that converts the signals being transmitted on optical fibre from the head end to an RF signal for transmission on coaxial cable, eg., optical/RF interface. Up to four coaxial cables may be connected to each Hub.
Global Network Amplifier (GNA)	An active RF device that amplifies forward and return signals in the feeder cable network and can divide the RF signal up to three ways
Line Extender (LE)	An active RF device that amplifies forward and return signals in the feeder cable network
Line Power Supply (LPS)	An active device that converts 240 Volts AC to 48 Volts AC which is then introduced onto the coaxial cable
Line Power Inserter (LPI)	A passive device that introduces the 48 Volts AC from the line power supply onto the coaxial cable
Customer Tap	Passive device installed at intervals along the hardline feeder cables to provide an interface for the connection of customer drop (lead-in) cables
Directional Couplers/Splitter	Passive device installed in the coaxial feeder cable network to divide the RF input power into 2 or 3 parts
In-Line or Distribution Slope Equaliser (DSE)	A passive device with an attenuation pattern which corrects for high frequency attenuation in the preceding cable/s span
Feeder Cable Network	The feeder cable network comprises coaxial cables, generally 0.750" and 0.500" hardline cable, from the Express Feed Network, interconnecting external devices.
Express Feed Network	The express feed network comprises the coaxial cables from the hub interconnecting feeder cable (DA) networks
Drop Cable	Customer cabling from a customer tap to the building point of entry
Power Blocking Device	A connector used to block AC power

Term	Definition
HST	Heatshrink Tube
PE	Polyethylene
PVC	Polyvinyl chloride

06 Attachments

Document number	Title
Nil	

07 Document control sheet

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Issue number	Issue date	Details on the change
1	10 January, 1997	Replacement document for VS-CNI-012
2	29 October, 1999	Reference to double insulated LPS, EPR requirements
3	22 May 2014	Add para 3.8