Electricity Distribution

nationalgrid

Company Directive

STANDARD TECHNIQUE: OS4A/5

Relating to the Location, Identification and Proving Dead of Underground Cables

Document Summary:

This document specifies the techniques and procedures to be followed for locating, identifying and proving **Dead** underground cables.

Author: **Eddie Cochrane**
Operational Safety Adviser

Implementation Date: **March 2022**

Approved:

Paul Woodward
Safety & Environment Manager

Date: **31st March 2022**

Target Staff Group	**All staff working on HV cables including SAPs, APs and Competent Persons**
Impact of Change	**Green – No impact**
Planned Assurance checks	**None required**

All references to Western Power Distribution or WPD must be read as National Grid Electricity Distribution or NGED

IMPLEMENTATION PLAN

Introduction

This document specifies the techniques and procedures to be followed for locating, identifying and proving **Dead** underground cables.

Main Changes

No Changes made.

Impact of Changes

No Impacts.

Implementation Actions

None required.

Implementation Timetable

This policy shall be implemented by following existing practices.

REVISION HISTORY

Document Revision & Review Table		
Date	**Comments**	**Author**
March 2022	• Document reviewed and no changes required at this time.	Eddie Cochrane
March 2019	• Section 6.1 updated to remove the proposed requirement for a noose to be used on an LV cable. (This change has been made as a page revision prior to the effective implementation date for ST:OS4A/4 following feedback from the TM implementation briefings)	Eddie Cochrane
14th March 2019	• Document reviewed – new general sections 1, 2, 3 and 4 added • Sections 6.1 and 7 - Updated to include use of a non-conductive "noose" to positively trace a cable from an identified point to the work position. • Appendices D & E added to give examples of test method for signal injection and application of shrouding adjacent cables.	Eddie Cochrane
November 2018	• Document reviewed – references updated • Section 3.4 – updated to allow spiking fluid filled cables and additional clarification added	Paul Woodward
August 2016	• Section 1.3 and 1.4 are added to include the considerations required at the design/ planning stage of work. • Section 1.9 references ST:CA14A and Appendix C regarding use of cable sniffers to locate faulty cables. • Appendix A has been revised to provide more clarity	Steven Pinkerton-Clark
4th August 2014	• Typographical corrections and references updated throughout. • Section 2.1 - clarification has been added to prohibit the use of reciprocating saws on cables that are not proved **Dead** • Section 2.4 has been extended to allow the use of an **Approved LV** cable identification tool. • Section 2.10 added to include reference to guidance at Appendix A. • Clarification has been provided at 3.1, 3.4 and 3.6 around the requirement to signal inject and spike HV cables • Section 5.4 inserted referring to spiking of cables on private networks. • Appendix A - inserted a flow chart and guidance for identifying **LV** cables. • Appendix B – inserted a draft of indemnity letter for spiking unidentified cables on private networks.	Steven Pinkerton-Clark
Nov 2013	• Document reviewed	Paul Woodward

Contents

1.0 INTRODUCTION

1.1 Before work can be undertaken safely on underground cable systems, the cable to be worked on must be identified as being the correct one before work commences. The Distribution Safety Rules (DSR) and this document detail the requirements that Shall be implemented to locate, identify and prove **Dead** such Apparatus.

2.0 RISK ASSESMENT

2.1 There is a risk of a serious or fatal injury from electric shock or burns if underground cables are incorrectly identified. An additional risk of injury arises when, even if underground cables have been correctly identified, cables are not proven **Dead** in accordance with the **Approved** procedure using **Approved** test equipment.

2.2 A site-specific risk assessment in accordance with ST:HS20A shall be carried out at the point of test and shall take in to account all cables present at the point of work.

3.0 GENERIC CONTROL MEASURES

3.1 Only people who have received appropriate training shall be involved in the process of identifying and proving **Dead** underground cables. As a minimum, the process shall be carried out by, or under the **Personal Supervision** of, an appropriately authorised person.

3.2 No assumptions are to be made from the actions of anyone else, such as civil teams, which lead to an individual assuming that they are working on the correct cable.

3.3 The process for identification and proving **Dead** of underground cables is detailed in the following sections of this ST. Where required, only **Approved** voltage testing devices shall be used, as detailed in ST:OS8A, to prove cables **Dead**.

4.0 RESPONSIBILITIES

4.1 It is the responsibility of everyone on site to ensure that no work commences until the cable(s) to be worked on has been correctly identified and marked in line with the procedures in this ST, and everybody is absolutely clear of the nature and extent of the work to be done.

4.2 In particular, it is the responsibility of any person intending to cut or open a cable to ensure the cable has been correctly identified and proved **Dead** before commencing their work

4.3 It is the responsibility of the **Senior Authorised Person** (SAP) in charge of the work, to correctly identify any HV cable and prove it **Dead** at the position where jointing activity is to take place.

5.0 CABLE LOCATION AND EXCAVATION

5.1 Serious injuries can result from the explosive effects and associated fire or flames when an electricity cable or joint faults. Cable damage may already be present or be caused during excavation by penetration with a sharp object or crushing. It is important that all work in the vicinity of cables at all voltages is carried out such as to reduce the risk of injury to the minimum.

5.2 Guidance on the general safety procedures for excavating in the vicinity of all utility services is given in HSE guidance note HS(G)47 and WPD Standard Technique relating to excavating and shoring is ST:HS14B.

5.3 For planned work the presence of underground cables in the working area Shall be identified at the design stage with the planner/ designer recording them on the Risk Register, or in the case of Complex Sites, the 'Hazard Identification Proforma' as outlined in ST:HS9B. The planner/ designer Shall also ensure that all relevant plans (geographic and schematic) are provided in the scheme file and that allowance is made for sufficient ground to be excavated.

5.4 The person responsible for delivery of the scheme/ project Shall ensure that the job instruction and any Work Instructions issued to a contractor identifies the presence of all adjacent cables and considers what additional resources may be required to positively identify the correct cable at the point of work, i.e. **Approved** LV cable identifier or attendance of an SAP in accordance with the Cable Identification flowchart in Appendix A.

5.5 Before excavation commences, accurate and up-to-date mains records Shall be consulted to determine the route and where shown the depth of all cables in the vicinity of the excavation. Location devices Shall be used to confirm the records. Where possible, the cable locations Shall be marked on the ground.

5.6 Before and during excavation, location devices Shall be used to confirm the proximity of cables. Careful manual excavation Shall be used in close proximity to any cables.

5.7 Sufficient ground Shall be excavated to enable the correct cable to be identified.

5.8 Excavation on a suspect or faulty **Live Low Voltage** cable Shall only be carried out a safe distance from a known fault or damage location such that no person present is placed at risk of injury. The safe distance Shall be determined from site conditions and take account of any measures that can be put in place to control the hazard.

5.9 Where a cable sniffer fault locator is used to locate a cable fault the procedures set out in Appendix C and ST:CA14A Shall be followed. To rule out false readings caused by gasses travelling along underground voids or ducting, the sniffer Shall be used at the proposed point of excavation to confirm no gas is present before digging starts.

5.10 If fault location techniques have proved inconclusive then the cable Shall be made **Dead** prior to or during excavation.

6.0 IDENTIFICATION AND PROVING DEAD - LOW VOLTAGE (LV) CABLES

6.1 LV cables Shall be identified from mains records and treated as **Live** until proved **Dead** at or near the point of work. Safe access to the cable cores for proving **Dead** Shall be at such points as LV feeder pillars or cabinets, link distribution boxes, cut-outs and pole-mounted fuses. The cable Shall then be visibly traced to the point of work. If no access is available to the cable cores near the point of work, the cable Shall be opened using **Approved Live** Working techniques. (Reciprocating saws and similar tools Shall not be used for this purpose).

6.2 Any cable warning device (e.g. tiles or tape) or the type of armouring Shall NOT be used to identify an **LV** cable. Positive visual indication that the cable is **LV** Shall be from one or more of the following methods:

- The presence of an **LV** service, street lighting or mains joint on the cable.
- Recognition that the cable is a CONSAC, WAVECON or CNE type with a PVC oversheath clearly embossed '600/1000v'.
- Where only two cables are present, both having been exposed, and the other cable clearly identified as a Red CAS or EPR type **HV** cable.

6.3 Where there may be discrepancies with records and no other means of positive indication can be achieved, or there is any other reason to doubt that a cable is **LV** work Shall not proceed and further advice Shall be sought.

6.4 Where doubt exists as to the correct identification of cables, other techniques such as the use of a WPD **Approved LV** cable identifying tool, electrical injection or spiking may be required.

6.5 Where more than one cable has been exposed at a work site, the cable to be worked on Shall be marked with adhesive tape immediately after identification.

6.6 When proving **Dead** on an **LV** cable with a separate street lighting core (5-core cables) the source of control of the street lighting core Shall be identified and effectively isolated. Where practicable, a **Caution Notice** Shall be fixed.

6.7 Following a careful written risk assessment of the hazards and consequences; a suspect damaged or faulty **LV** cable may be opened using **Approved Live Working** techniques away from the point of damage to carry out tests or cut cores. This assessment Shall indicate whether all or part of the work may proceed with the cable **Live** and detail the work method and precautions to be taken. All work on **Dead** faulty, or suspect faulty cables will be in accordance with the Distribution Safety Rules.

6.8 Only **Approved** voltage testing devices Shall be used to prove **Dead**.

6.9 No assumption Shall be made that any **LV** cable with exposed **Conductors** (whether from damage or otherwise) is **Dead**.

6.10 Attached at Appendix A is a flow chart and checklist of actions to be used as a guide to aid in the correct identification of **LV** underground cables.

7.0 IDENTIFICATION AND PROVING DEAD - HIGH VOLTAGE (HV) CABLES

7.1 **HV** cables Shall be identified from mains records and confirmed by electrical injection tests as set out in Appendix D except:

(a) Where a cable is exposed over its whole length from the point of work to an already identified point such as a switch or pole box and can be physically traced over that length, or

(b) Where it is not reasonably practicable to carry out electrical injection tests, only one **HV** cable is known to be present in the locality and all other cables have been exposed and positively identified as **LV**, or

(c) Where a cable is exposed over its whole length and it can be unequivocally determined that it is not connected to the distribution network.

7.2 To identify a cable that is exposed, it must be positively traced along its entire route from the known **Earthed** termination or a previously positively identified and spiked location, to the point of work.

In all such circumstances a running 'noose' of non-conductive material shall be looped around the cable at the known point of identification and/ or Earth connection and moved along the cable to the point of work. If a cable passes through a hole in a wall, it is mandatory to run the noose through the hole. Tugging the cable, using rods, or any other unapproved techniques are prohibited.

The cable is not deemed to be identified until the noose has arrived at the point of work and the cable has been marked. If it is not possible to use a running noose, an alternative **Approved** method must be used (e.g. signal injection).

7.3 In circumstances where identification of a particular cable by electrical injection is not practicable (e.g. when the cable is terminated in a stop-end joint) every effort Shall be made to expose and identify all adjacent cables from mains records before the cable is spiked. When records are inadequate it may be necessary to use electrical injection or use sheath induction tests on these adjacent cables.

7.4 When more than one cable (HV or LV) is visible at a work site the cable to be worked on Shall be clearly marked with adhesive tape immediately after it has been identified and before any work takes place (Appendix E).

7.5 After the cable to be worked on has been identified and marked, then any exposed adjacent cables shall be "screened" in accordance with DSR rule 4.1.1, with DANGER LIVE EQUIPMENT signs (Appendix E).

7.6 When an HV cable has been identified to be worked on, in all circumstances other than those set out in section 10 below, it Shall be proved **Dead** before work commences; normally by spiking with an Acvoke cable spiking gun. Where a fluid filled cable is to be spiked, the **Authorised Person** responsible Shall take steps to manage the release of insulating fluid caused by spiking. The procedure for spiking a High Pressure Gas Compression cable is set out in ST:CA11C.

7.7 The **Distribution Control Engineer** Shall be contacted immediately before and immediately after the operation of the spiking gun. The spiking gun Shall not be removed until the **Distribution Control Engineer** and field operator are satisfied that it is safe to do so.

7.8 When a cable is to be cut close to the plumb of an already identified cable box or pole termination at which the cable is **Earthed** the spiking may be dispensed with. Where such a cut is being made on a cable connected to a free standing switch, all cables connected to that switch Shall be identified before the cut is made.

8.0 IDENTIFICATION - TRANSFORMER NEUTRAL CABLES

8.1 In certain Primary Substations the 33/11kV transformers share common earthing equipment with the neutral cables connected to selection isolators. In such cases a special procedure will be required to positively identify the transformer neutral cables. Signal injection will not be effective and as neutral cables are normally volt-free, spiking the cable or closing the earthing isolators to the solid earth position will not positively identify the cable or prove that it is safe to work on.

8.2 The transformer neutral cable(s) may be identified by physically tracing them PROVIDED the correct earthing isolator for the transformer can be positively identified. If this has not been done previously, the correct isolator Shall be proved by means of the test set out in paragraph 4.3 below:

8.3 To prove the correct earthing isolator:

- Isolate and earth the transformer in the normal way.
- Close the transformer neutral isolator to solid earth.
- Issue a **Sanction-for-Test**.
- Prove **Dead** and insert **HV** test prods into the feeder spouts of the transformer 11kV circuit breaker.
- Perform an earth continuity test on any phase from the transformer 11kV circuit breaker spouts through the transformer windings to the earthing isolator. A low reading should be observed due only to the resistance of the transformer windings.
- Open the transformer neutral isolator.
- Repeat the continuity test. If the correct isolator has been operated the test will show infinite resistance.
- Close the neutral isolator, remove the test prods, re-apply the **Circuit Main Earth** through the 11kV CB and cancel the **Sanction-for-Test**.

8.4 Where the neutral isolator has been positively identified, the neutral cable Shall be physically traced to the intended point of work either from the transformer or the neutral isolator. Spiking Shall NOT be used as a means of proving that the cable is safe to work on.

9.0 ADDITIONAL PRECAUTIONS - WORKING ON PRIVATE NETWORKS

9.1 No relaxation of the procedures within this standard technique are permitted when WPD staff work on private networks. WPD records and any private records Shall be consulted to assist with cable identification.

9.2 Additional hazards associated with private networks include:

(a) advice from third parties as to the identification of private or WPD cables may be suspect and should be confirmed by **Approved** procedures

(b) private cable records may be non-existent or unreliable

(c) WPD cables, both **HV** and **LV**, may co-exist alongside private cables on private property.

(d) cable types, not familiar to WPD staff, may be encountered.

9.3 All work on private **HV** networks Shall be carried out in accordance with the appropriate WPD rules and procedures.

9.4 Occasionally WPD staff are requested by third parties to prove unidentified cables **Dead** by spiking. There is generally no statutory obligation on WPD to carry this out and there may be risks associated with this, such as serious injury and/or damage to equipment and assets. Before carrying out any such spiking activities, and where the requestor is acting on behalf of a company, WPD staff Shall obtain a signature from the requestor, on a letter of indemnity as shown in Appendix B. If the request to spike a cable is received from an individual further advice Shall be sought from the Safety Team.

10.0 IDENTIFICATION OF HIGH VOLTAGE CABLES - WORKING ON THE SHEATH ONLY

10.1 The following procedure applies when work is only required to take place on the serving, armour or sheath of 6.6, 11, 33 and 132kV cables without access to the insulation covering the C**onductor**s. In this context sleeves, plumbs and joint seals are considered to be part of the cable sheath and for fluid filled cables this also includes the associated oil pipework.

10.2 If removal of the cable sheath or joint sleeve is required, operations Shall be carried out in accordance with section 3.0 above and Distribution Safety Rule 5.9.

10.3 This procedure permits the re-plumbing of joints, maintenance of 33kV barrier joints and similar work. It Shall also permit minor repairs to cable sheaths, but if the repair is required as a result of third party contact the work Shall only proceed after a careful examination of the cable and a risk assessment by a **Senior Authorised Person.**

10.4 Identification will take place as in 3.0 above except that the cable will not be spiked. The **Sanction-for-Test** will be endorsed "only injection tests for identification purposes are to be carried out".

10.5 All cables present at the point of work Shall be exposed and each cable and joint identified from records by the **Senior Authorised Person** in charge of the work.

10.6 The **Senior Authorised Person** Shall confirm the identity of the cable to be worked on at the point of work by means of electrical injection applied between cores.

10.7 The cable to be worked on Shall be marked with tape by the **SAP,** or **Person** acting under their **Personal Supervision,** on each side of the point of work.

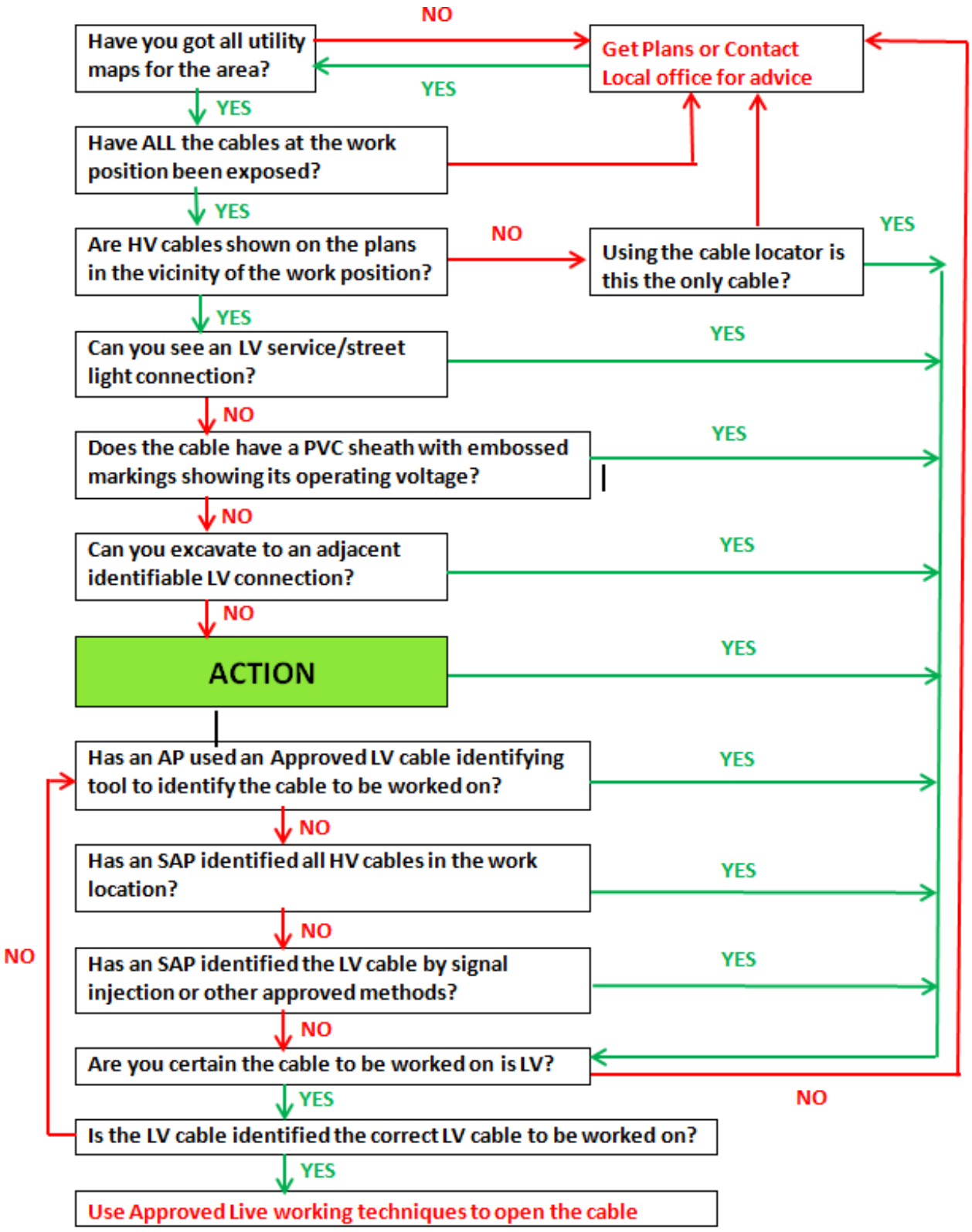
10.8 The **Senior Authorised Person** Shall issue A **Limitation of Access** and give **Personal Supervision** to the commencement of the work. The **Limitation of Access** Shall state "there Shall be no interference with the screen or insulation of the cable cores".

10.9 The **Sanction-for-Test** Shall not be cancelled until the **Limitation of Access** is cancelled on completion of the work.

10.10 Where appropriate, work Shall be carried out in accordance with AP12 of the Distribution Safety Rules.

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

PROCEDURE FOR LOW VOLTAGE CABLE IDENTIFICATION (Revision 1)



REMEMBER, IF IN DOUBT, STOP AND ASK FOR ADVICE

PROCEDURE FOR LOW VOLTAGE CABLE IDENTIFICATION

Application:

- Incidents have occurred where "HIGH VOLTAGE" underground cables have been incorrectly assumed as "LOW VOLTAGE" cables. These incidents could have led to a serious injury or a fatality.

- It is important that procedures are followed which will prevent any such incidents and that any cable is positively identified before work can begin. Positive identification requires the type of cable to be established beyond doubt.

- The procedure for identification of underground cables is detailed in ST:OS4A.

- Throughout Western Power Distribution regions there are types of HIGH VOLTAGE cables which could be mistaken for LOW VOLTAGE cables.

- Typical of these HIGH VOLTAGE cables are PILCSTA (Paper Insulated, Lead Covered, Steel Tape Armoured) and plain lead covered cables. Also 33kV Polymeric single core cables can resemble a Wavecon cable.

Procedure:

Whilst every effort is made to ensure that cable records are accurate, site conditions can change without our knowledge and consequently records are not totally reliable. In order to ensure safety of persons and the safety of the electricity system, records should only be used as a guide and the following points should be observed:-

- Positively identify all cables prior to work commencing to ensure that cables energised at HIGH VOLTAGE could not be mistaken for LOW VOLTAGE.

- In order to positively identify LOW VOLTAGE cables, the procedures detailed in the chart overleaf and ST:OS4A Shall be followed.

- Check records to ensure all cables on site are shown. It is possible that not all cables have been recorded and will not be shown on our records.

- There may be cables present that are not owned by WPD, these may belong to other parties such as: Private systems, National Grid circuits, Street lighting authority circuits, Telecoms and cable TV circuits

If there is any doubt, a **Senior Authorised Person** Shall attend site and decide how positive identification can be achieved.

Always check details to confirm cable type as you proceed with each stage of the jointing process.

APPENDIX B

TO BE TYPED ON WESTERN POWER DISTRIBUTION HEADED PAPER

[Address]

[Date]

Dear

Request to prove cable Dead by spiking ("Cable Spiking")

Further to the letter of request dated [DATE] from [FULL NAME OF COMPANY] (the "Company") this letter is to confirm the terms upon which Western Power Distribution [Regional Licence Area] ("WPD") will carry out the Cable Spiking to the cable you have identified (the "Cable") at the site identified on the attached plan ("the Site").

In consideration of WPD agreeing to carry out the Cable Spiking, the Company agrees as follows:

1. **Searches -** Prior to WPD carrying out the Cable Spiking the Company will undertake all relevant searches and use all reasonable endeavours to determine the owner of the Cable and notify WPD of the same.

2. **Payment -** The Company shall pay a charge of [£NNN] to WPD in respect of the Cable Spiking. Payment will be made prior to the Cable Spiking being carried out.

3. **Liability**

3.1 The Company acknowledges that WPD is carrying out the Cable Spiking at the Company's sole request and that spiking of cables carries a risk of death, injury and damage to property.

3.2 The Company agrees to be solely responsible for the safety of all persons and property present on or near to the Site when the Cable Spiking is carried out and, subject to paragraph 3.3. below, the Company assumes all liability for loss, damage, death or injury caused to:
(a) the Company and its employees, agents, contractors and sub-contractors;
(b) WPD and its employees, agents, contractors and sub-contractors; or
(c) any third parties present at or near to the Site, whether or not the Company is aware of or has authorised such presence.

3.3 WPD accepts liability for death or personal injury caused by its negligence and any other liability which cannot by law be limited or excluded. WPD excludes, to the fullest extent permitted by law, all liability for any other injury, loss or damage, howsoever caused, which may be sustained by any third party or by the Company including its employees, agents, contractors and sub-contractors in connection with the Cable Spiking.

4. Indemnity

4.1 The Company agrees to indemnify WPD and each of the other members of the WPD group of companies and their respective officers, directors, employees and agents and to keep each of them fully indemnified at all times from and against all damages or injury to any person or to any property and against all penalties, fines, actions, suits, claims, demands, costs (including, without limitation, reasonable legal costs), losses, charges and expenses arising out of or in connection with the Cable Spiking, including in particular (without limitation) all those arising from, resulting from or connected with:

(a) injury, death or loss of or damage to property caused to WPD or its employees, contractors, sub-contractors or agents (unless caused by the negligence of WPD);

(b) a claim or claims for personal injury, death or loss of or damage to property by any third party (unless caused by the negligence of WPD); or

(c) any damage or loss of functionality caused to the Cable or any other cables located at or near to the Site, whether or not they are electricity cables.

5. Termination - Either party may terminate this letter at any time by written notice to the other party. On termination or expiry of this letter for any reason, paragraphs 2, 3, 4 and 6 will remain in full force and effect. Where WPD chooses to terminate this letter, it shall reimburse any charges paid under paragraph 2 of this letter to the Company.

6. Governing law and jurisdiction - This letter will be governed by and construed in accordance with English law and the parties submit to the exclusive jurisdiction of the English courts.

Please sign below if you accept the terms of this letter.

Yours sincerely

Western Power Distribution [Regional Licence Area] Plc

The terms of this letter have been agreed to by both WPD and the Company and the Company accepts the limitations and liability set out herein. This letter is signed below for and on behalf of the Company by an authorised signatory.

Signed for and on behalf of the Company……

Name:

Designation:

Dated:

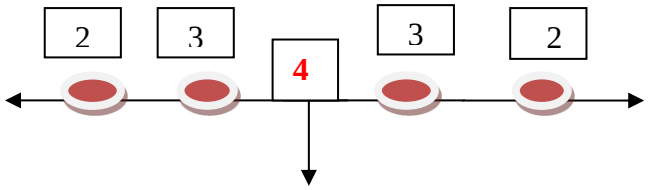
APPENDIX C

GUIDANCE FOR USE OF FAULT LOCATING SNIFFER DEVICE
(See also ST:CA14A)

When a fault location is established using a cable sniffer device, a minimum of two readings need to be taken at the point where the initial cut and test excavations are to take place. The readings should reduce from the highest value location to the far end of the joint bays. If there is an increase in the value then further investigation needs to take place.

Sniffer readings are to be carried out and recorded at each excavation location and readings must be equal to or lower than the lowest reading recorded at any other test position - before any ground can be excavated.

'Joint bay (JB) to cut and test'.
Two readings shall be taken here, one to rear of JB and one to front. These readings need to be lower or equal to the lowest reading outside of the JB area.



Highest value 4, reducing at all points towards the joint bays, with the lowest reading at the far side of the joint bay.

'Joint bay (JB) to cut and test'.
Two readings shall be taken here, one to rear of JB and one to front. These readings need to be lower or equal to the lowest reading outside of the JB area.

Indicating the barholes

IDENTIFICATION OF CABLES BY SIGNAL INJECTION

General

The following examples illustrate the methods to be adopted when identifying cables. Although very simple circuits are shown, the principles apply to more complex circuits.

In the case of a trefoil group using polymeric single core cables, if there is more than one circuit present, the test shall be repeated with the sender connections changed to a different combination of cores, so as to prove that the three single core cables to be worked upon, are part of the same circuit.

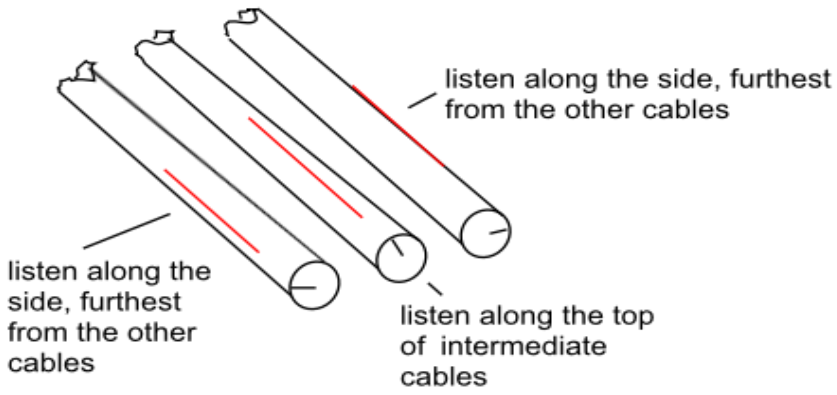
Recommended Practice When Using Signal Injection

When the signal injection instrument has been connected to the circuit and the signal is being injected, before leaving the point of injection (usually an item of switchgear), it is good practice to use the signal detector at that point, to ensure that a satisfactory level of signal is present in the cable. The opportunity can also be taken to listen to the character of the signal, so that a comparison can be made later, at the point where the cable is required to be identified.

At the intended point of work, where the cable is required to be identified, all cables must be checked with the signal detector.

If no signal is detected on the exposed cable, or if the signal is very weak, the signal detector can be used to check the ground below the cable, or the sides of the excavation, to see if a signal can be detected from an unexposed cable. Even if a satisfactory signal is detected on the expected cable, it is good practice to check the soil in this manner, as this may give an indication of any cable carrying the signal, which has not been exposed.

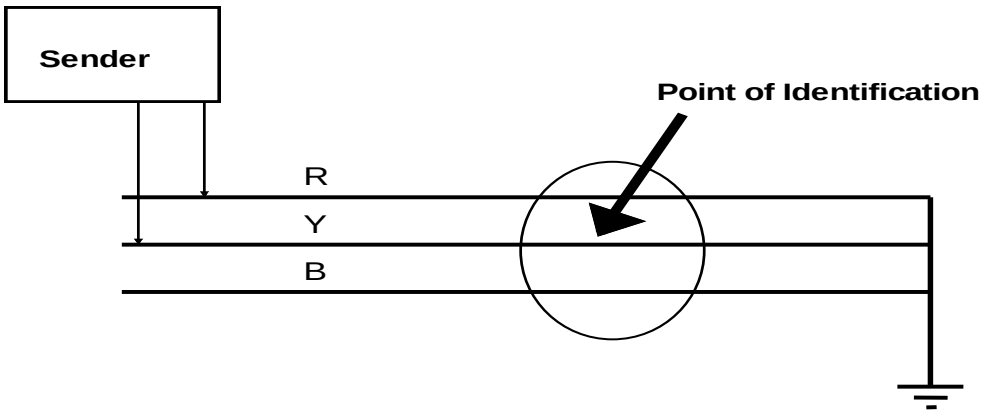
The diagram below shows the optimal position to use the signal detector, when multiple three core cables are present.



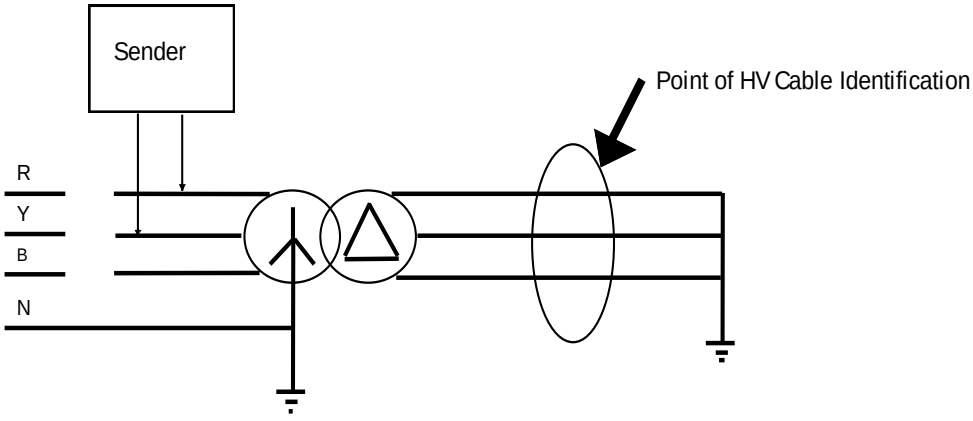
Plain Feeder

The signal injection device is connected to one end via test plugs, or test connections.

The other end of the cable is connected to **Earth**.



Direct cable connection to a Distribution Transformer



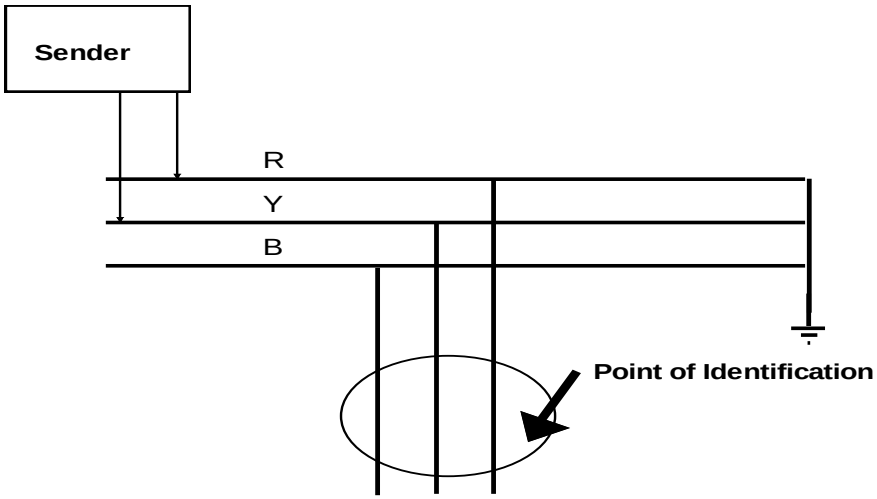
If it is not possible to make direct connection to the cable a signal may be injected through a distribution transformer.

Remember that the **LV** may still be **Live** in part of the feeder pillar or cabinet.

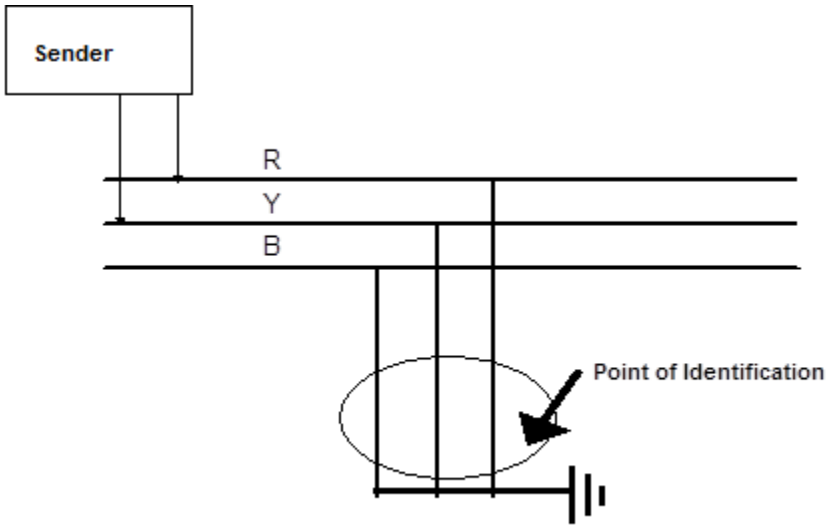
Connecting the sender unit to a **Live** supply will cause serious damage.

Teed Feeder

It is necessary to perform at least **two** tests, preferably leaving the sender connected at the same point throughout.



Test 1 - With **Earths** removed from the leg to be identified ensure no signal is detected. Do not spike until the second test has been completed.



Test 2 - With an **Earth** re-applied to the leg to be identified, remove the **Earths** from the alternative leg(s) and ensure a signal is detected in the leg to be identified.

A further test can be carried out if all **Earths** are not replaced during spiking as the signal will disappear on the **Earthed** side of the cable spiked location.

APPENDIX E

PHOTO EXAMPLE OF CABLE SCREENING

APPENDIX F

SUPERSEDED DOCUMENTATION

This document supersedes ST: OS4A/4 dated March 2019 which has now been withdrawn.

APPENDIX G

RECORD OF COMMENT DURING CONSULTATION

Comments – ST: OS4A/5

APPENDIX H

ASSOCIATED DOCUMENTATION

ST: OS6E	-	Work on Privately owned High Voltage Networks
ST: HS14B	-	Excavating and Shoring - HSE Guidance Note HS(G)47
ST: OS8H	-	Operation, Use and Maintenance of the Acvoke Cable Spiking Gun
ST: CA11B	-	Operation, Maintenance and Repair of 33, 66, 132 and 275kV Fluid Filled Cables
ST: CA11C	-	Relating to the Opening of Steel Pipes Associated with High Pressure Gas Compression Cables

APPENDIX I

KEY WORDS

Location, Identification, Proving Dead, Excavation, Safe Access, Spiking, Electrical Injection, Acvoke, Private Networks, Sheath.