ENGINEERING OPERATING STANDARD

EOS 02-0042

DECOMMISSIONING PRESSURISED UNDERGROUND CABLES

Network(s): EPN, LPN, SPN

Summary: This operating standard details the actions taken to decommission pressurised underground cables which are taken out of operational service within UK Power Networks.

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## Revision Record

<table>
<thead>
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**Reason for update:** Periodic review

**What has changed:** Section 12 updated and reformatted, reference to ENA TR 135 changed to ENA ER C135 following the publication of a revised document.

**Reason for update:** Periodic review

**What has changed:** Sections 5 and 6 updated giving more detail to gas cable commissioning

Document reviewed for publication onto the G81 site
Contents

1 Introduction .................................................................................................................................. 4
2 Scope ........................................................................................................................................ 4
3 Definitions .................................................................................................................................. 4
4 Objective .................................................................................................................................... 4
5 Risk Posed by Pressurised Cable Systems .................................................................................. 5
6 Decommissioning Pressurised Underground Cable Systems ......................................................... 5
   6.1 Full Removal of Pressurised Cable and Associated Assets .................................................. 6
   6.2 Part Removal of Pressurised Cable and Associated Assets ................................................. 6
   6.3 Purging of Fluid-filled Cables and Associated Equipment .................................................. 6
   6.4 Monitoring .......................................................................................................................... 6
7 Civil Asset Rectification Work ...................................................................................................... 7
   7.1 Pumping Points ..................................................................................................................... 7
   7.2 EHV Link Boxes .................................................................................................................... 7
8 Managing Waste and Redundant Equipment ............................................................................... 7
9 Contaminated Ground ................................................................................................................. 7
10 Responsibilities .......................................................................................................................... 7
11 Updating Asset Records ............................................................................................................... 8
   11.1 Asset Records ....................................................................................................................... 8
   11.2 NetMAP ................................................................................................................................ 8
12 References ................................................................................................................................... 8
   12.1 UK Power Networks Standards ......................................................................................... 8
   12.2 National and International Standards .................................................................................. 8
1 Introduction

This operating standard details the actions taken to decommission pressurised underground cables which are taken out of operational service within UK Power Networks.

The purpose is to give guidance to minimise the possible effect on safety and environmental risks that this decommissioning may impact upon.

2 Scope

This standard covers the decommissioning of all of the pressurised underground cables across the three Distribution Networks covering the whole of London (LPN), the East (EPN) and South East of England (SPN) operating at High Voltage (HV) and Extra High Voltage (EHV) up to and including 132kV. It does not cover the network operation and maintenance of these cables.

3 Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Abandoned cable</td>
<td>Any cable no longer needed by UK Power Networks to supply electricity.</td>
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<tr>
<td>APP</td>
<td>Asset Portfolio Plan (formerly NAMP - Network Asset Management Plan)</td>
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<tr>
<td>Decommissioning</td>
<td>Taking out of service pressurised cables from the operational network, associated ancillary equipment and civil assets.</td>
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<tr>
<td>Environmental Risk</td>
<td>Impact to the environment based on proximity to groundwater abstraction boreholes, surface waters, and aquifers.</td>
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<tr>
<td>Rating</td>
<td></td>
</tr>
<tr>
<td>Free phase fluid</td>
<td>Cable fluid which is able to migrate along the cable/joints/tanks to a collecting point, generally fluid not retained within the insulation papers.</td>
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<tr>
<td>Idle cable</td>
<td>Any cable that that may be required for future use.</td>
</tr>
<tr>
<td>Pressurised cables</td>
<td>Pressure assisted cables are either fluid-filled or gas (Nitrogen) and forms most of the EHV (33, 66 and 132kV) network.</td>
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4 Objective

The objective of this standard is to ensure that the decommissioning of all pressurised cable assets is managed, and protects the safety of the public, the environment and reduces any future asset maintenance legacy risk, taking into account asset condition deterioration and maintains legal compliance. Whilst at the same time ensuring value to customers and minimising risk to employees and contractors.
5 Risk Posed by Pressurised Cable Systems

Pressure assisted cables are either fluid-filled or gas (Nitrogen) and form a large part of the EHV (33, 66 and 132kV) operational network. Of these two types of cable design, the fluid-filled ones pose the greatest risk to the environment. This risk could occur, if the cable leaks into the environment through the cable sheath or through its ancillary equipment. The severity of the resultant pollution incident is dependent on the environmental sensitivity of the area and the volume of free phase cable fluid likely to be released.

In addition to the environmental risk posed by the fluid-filled cables, both types of cables could pose a general safety risk to the general public in the event of a civil assets failing, such as a road/pit cover collapsing. This standard has been developed to put in place a common approach to the decommissioning of fluid-filled cables and their associated civil assets, and will apply retrospectively to assets already taken out of service. It has been identified that a number of civil assets remain on the network within UK Power Networks, which will need to be decommissioned in line with this standard. These are to be identified and a programme of retrospective civil asset rectification will be produced, enabling them to comply with this standard.

Nitrogen Gas pressurised cables require additional safety operational considerations as defined in ENA TS 09-04 – ‘66KV and 132kV Impregnated Paper Insulated Oil-Filled and Gas Pressure Type Power Cable Systems’, including the staged release of pressure when depressurising the system.

6 Decommissioning Pressurised Underground Cable Systems

All fluid filled cable replacement schemes shall include a decommissioning plan. This plan will detail the most reasonably practical engineering solution taking into account environmental, legal, safety and customer value.

There are two methods of decommissioning suitable for fluid filled cables, full removal or part removal both involve purging. (Purging involves the removal of free phase fluid from the cable using pressurised nitrogen gas).

All Nitrogen gas decommissioning cable schemes should take into account the removal of ancillary civil and engineering assets.
6.1 Full Removal of Pressurised Cable and Associated Assets

With this method the cable, joints and associated equipment are removed by excavation including all ancillary equipment such as, pressure tanks and link boxes, allowing in some cases the release of land from operational status.

This technique removes all long term risks associated with the pressurised cables and ancillary equipment. However, removal of the cable and buried joints/tanks is likely to cause major disruption to highways and other land users. As such it is the most costly solution and may on its own produce short term safety and environmental risks that need to be carefully managed, especially with the possibility of adjacent circuits remaining in service. There is also a significant environmental impact from the energy used in the activity of recovering the cables, such as traffic congestion and the manufacture, installation and disposal of excavation materials.

Where pressurised cables can be easily accessed i.e, routed in basements, culverts, tunnels, troughs and bridges, full removal should be the preferred option.

6.2 Part Removal of Pressurised Cable and Associated Assets

Ancillary equipment such as, gauges, valves, pipe work and associated accessible equipment; (i.e. surface mounted tanks, gas cylinders, etc) shall be removed. Also easily accessible joints and buried cable fluid tanks shall be removed. All associated pits and excavations shall be permanently reinstated. Any remaining sections of buried fluid-filled cable and joints shall be purged of all free phase fluid.

6.3 Purging of Fluid-filled Cables and Associated Equipment

To effectively remove all free phase fluid held within a fluid-filled cable, effective purging (draining) is required. At practical points along the cable section a combined draining/monitoring point shall be created at the lowest point. Cable fluid can then be collected in suitable containers, following purging with Nitrogen from a high point on the same section. The gas pressure used must not exceed the maximum running pressure of the system it has been connected to.

Each section of cable being purged will require its own degree of purging dependant on its size, design and length of section etc. Purging will continue until the free phase fluid ceases to come out of the drain point.

On completion of the purging process all cable ends shall be sealed, with the provision of a bleed pipe to enable future monitoring of any free phase fluid which may build up in the future.

6.4 Monitoring

The amount of cable fluid retrieved shall be measured and recorded in the Asset Register, as recovered cable fluid from the section of cable being decommissioned. An estimate on the total volume of free phase fluid in the cable section shall be noted in the Asset Register.

The decision to continuously monitor the decommissioned cables, shall be made after the purging has been completed and an assessment of the volume of remaining cable fluid left within the insulation papers and core shall then be made.
7 Civil Asset Rectification Work

7.1 Pumping Points

Pumping points existing at each end and along the length of a pressurised cable route are continued either in underground chambers (pits) or above ground in a substation compound, kiosk or building. When all of the pressurised cable assets in the pumping point have been either removed or decommissioned, the civil asset will be re-instated/demolished/removed and ground remediation carried out to mitigate future asset legacy risks.

7.2 EHV Link Boxes

Pressurised cable system link boxes along the cable route will be removed and the site re-instated following completion of decommissioning works.

8 Managing Waste and Redundant Equipment

All cable fluids removed from decommissioned cables and contaminated equipment shall be treated as hazardous waste and disposed of in accordance with HSS 01 030 ‘Waste Management’.

Lengths of cable, individual cable joints and tanks (if completely drained of free phase fluid) are classified as scrap metal and shall be segregated for recycling in accordance with HSS 01 030.

All redundant pressurised Nitrogen gas cylinders, pallet containers and dewers shall be returned to the supplier of the equipment.

9 Contaminated Ground

All contaminated ground found during recovery and replacement works shall be managed in accordance with HSS 01 009 'Environmental Management of Fluid-filled Cables'.

10 Responsibilities

UK Power Networks Asset Management shall ensure the condition of all of the pressurised cables in service is assessed.

UK Power Networks Asset Management shall:

- Periodically review the condition data and environmental route risk assessment to determine the priority for decommissioning cables.
- Agree the pressurised cable decommissioning forward plan as part of the asset replacement investment process.

UK Power Networks Infrastructure Planning shall declare if the cable is to remain available for future use when preparing cable replacement schemes.

Project Managers shall:

- Carry out a feasibility study to prepare the decommissioning scope of works with the specific risk assessment and method statement for the removal of each cable route such that the safety aspects and damage to the environment is minimised at all times.
11 Updating Asset Records

11.1 Asset Records

The Project Manager will notify Asset Management and submit the Asset Register Updating Form to the Asset Registration Team.

Where the removal of cables, joints and tanks has not been possible, it shall be recorded in the Asset Register as being 'Decommissioned'. Assets which have been physically removed shall be recorded as 'Disposed Assets' and removed from the Asset Register.

11.2 NetMAP

The Project Manager responsible for decommissioning. Ensure that the records on NetMap and the Asset Register are amended accordingly within 30 days of the completion, removal, decommission or abandonment (Out of Use) of the cable and ancillary equipment.

12 References

12.1 UK Power Networks Standards

- HSS 01 009 Environmental Management of Fluid-filled Cables
- HSS 01 020 Undertaking Environmental Risk Assessments
- HSS 01 030 Waste Management

12.2 National and International Standards

- ENA TS 09-04 66kV and 132kV Impregnated Paper Insulated Oil-filled and Gas Pressure Type Power Cable Systems
- ENA ER C135 Guidance for the Operation and Management of Fluid-filled Cables