

## 1. SCOPE

This document details the application of SOP 2017/407/00 (Applicable to testing and phasing out procedures on Hawkgas HG12 Switchgear) issued by the Energy Networks Association.

## 2. ISSUE RECORD

This is a Reference document. The current version is held on the EN Document Library.

**It is your responsibility to ensure you work to the current version.**

Issue Date	Issue No.	Author	Amendment Details
4 <sup>th</sup> July 2017	1	Maria Anzola	Original Issue
17 <sup>th</sup> July 2017	2	Maria Anzola	Update following initial investigation.
28 <sup>th</sup> July 2017	3	Maria Anzola	Update of Section 8 as per updated OPSAF template
23rd July 2019	4	Kevin Butter	Updated following completion of investigation and amendments to working procedures. SOP lifted on all affected equipment

## 3. ISSUE AUTHORITY

Author	Owner	Issue Authority
Name: Kevin Butter Title: Lead Engineer	Name: Fraser Shaw Title: Substations Manager	Name: Fraser Ainslie Title: Head of Engineering Design and Standards

## 4. REVIEW

This is a Reference document which has a 5 year retention period after which a reminder will be issued to review and extend retention or archive.

## 5. DISTRIBUTION

This document is not part of a Manual maintained by Document Control and does not have a maintained distribution list.

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## 7. SOP DETAILS

<b>EQUIPMENT TYPE</b>	Hawkgas HG12 – Hawker Siddeley Switchgear Ltd. <b>Additional Equipment affected:</b> Metrohm/ Edgcumbe Instruments Ltd/ High Voltage Instruments Ltd. LLT Live Line Tester (and associated Phasing Rod) moving coil type - this is referred to as Moving Coil Voltage Indicator in SPEN.
<b>ORIGINATING COMPANY</b>	SP Energy Networks
<b>DATE</b>	4 <sup>th</sup> July 2017
<b>NUMBER INSTALLED IN ENERGY NETWORKS NORTH</b>	741
<b>NUMBER INSTALLED IN ENERGY NETWORKS SOUTH</b>	609
<b>REASON</b>	<p>An Engineer was in the process of carrying out a live phase check between the busbar spouts and circuit spouts on an 11kV transformer incomer panel at Newton Stewart Primary Substation using an 11kV moving coil live line tester and phasing rod when a flashover occurred.</p> <p>The flashover occurred between the Yellow phase fixed contact inside the spout and the associated shutters when the 11kV phasing rod was inserted into the Yellow phase Circuit (incomer) spouts as part of the phase checking procedure.</p> <p>As a result of the flashover, the Engineer received serious burns to his face and hands.</p> <p>See DIN 2017/0019/00.</p>
<b>STATUS IN INITIATING COMPANY</b> <b>(See update 23 July also).</b>	<p>While the incident referred to in DIN 2017/0019/00 is under investigation and as an additional precaution, Metrohm/ Edgcumbe Instruments Ltd/ High Voltage Instruments Ltd. LLT Live Line Tester (and associated Phasing Rod) shall not be used for any testing or phase checking within the spouts of Hawker Siddeley Switchgear Hawkgas HG12 11kV switchgear.</p> <p>Metrohm/Edgcumbe Instruments Ltd/ High Voltage Instruments Ltd. LLT Live Line Tester (and associated Phasing Rod) shall not be inserted into the spouts of any type withdrawable HV switchgear, unless the instrument has been tested and certified for use with a test date of on or after 26th June 2017.</p> <p>Before any type of HV test instrument is inserted into the spouts of any type of withdrawable HV switchgear, the fixed portion spouts and moving portion bushings shall be visually inspected to ensure they are clean and show no signs of partial discharge or other degradation.</p> <p>Before any type of HV test instrument (including live line testers, phasing rods, extension rods and bent end adaptors etc.) is</p>

inserted into the spouts of any type withdrawable HV switchgear, the instrument shall be visually examined for any signs of damage and cleaned as required.

#### SPEN APPLICATION

As detailed above.

A Panel of Inquiry has been set up to investigate the cause of the incident and to identify any contributory factors which may have had an impact on the cause or severity of the event.

EA Technology in conjunction with SP Energy Networks, Hawker Siddeley Switchgear and HVIL, manufacturer of the high voltage testing equipment are carrying out a forensic investigation on the switchgear and test equipment involved in the incident to establish the cause of the flashover inside the spouts.

Once the investigation has progressed, an update will be issued.

#### ADDITIONAL INFORMATION

A Panel of Inquiry was set up to investigate the cause of the incident and to identify any contributory factors which may have had an impact on the cause or severity of the event.

EA Technology in conjunction with SP Energy Networks, Hawker Siddeley Switchgear and HVIL, manufacturer of the high voltage testing equipment are carrying out a forensic investigation on the switchgear and test equipment involved in the incident to establish the cause of the flashover inside the spouts.

#### UPDATE 23 JULY 2019

**This SOP and been lifted and the restrictions affecting the use of LLT Live Line Testers and Hawkgas HG12 switchgear as described in the section “Status in initiating company” have been lifted in SPEN.**

The lifting of this SOP has been based on the findings of forensic investigation on the switchgear and test equipment involved in the incident by independent experts in conjunction with SP Energy Networks, Hawker Siddeley Switchgear and HVIL (manufacturer of the high voltage testing equipment). Additionally, SPEN's internal safety procedures have been revised as described below.

Investigation of the switchgear confirmed that a flashover and power arc occurred between the fixed contact in the spout and the earthed metal components at the bottom of the spout.

Examination of the moving portion of the Hawker Siddeley HG12 circuit-breaker (which was withdrawn immediately before the incident) revealed evidence that a low-energy flashover had occurred on the circuit-breaker isolating bushings/spouts at some time previously. This low-energy flashover explained the presence of carbon deposits found on the moving portion bushing. It is considered probable that carbon was also deposited on the inside surface of the spout and led to a flashover when the phasing rod was inserted into the spout.

Inspections of other HG12 fixed portions and moving portions within SP Energy Networks has not revealed any signs of similar degradation.

**Based on the findings from the examinations and switchgear inspections as described above it has been concluded that the cause of the flashover is not attributable to any Type defect of the HG12 switchgear involved in the incident.**

The dielectric integrity of the Live Line Tester and Phasing Rod voltage withstand tests which have demonstrated satisfactory dielectric integrity. The independent expert investigation, of the Live Line Tester and Phasing Rod identified no defects and ruled out this equipment as a contributing factor to the incident. Subsequently all Metrohm/ Edgumbe Instruments Ltd/High Voltage Instruments Ltd. LLT Live Line Tester and Phasing Rods within SPEN have been inspected and tested and have been found to be satisfactory.

**Based on the findings from the forensic investigations and the inspections/tests carried out on Live Line Testers and Phasing Rods it has been concluded that the cause of the flashover is not attributable to the Live Line Tester and Phasing Rod involved.**

**The following enhancements have been made to SPEN processes to prevent reoccurrence of similar incidents:**

OPSAF-12-004 (LWM 2.2) has been updated to define the different acceptable techniques for carrying out phasing checks after completion of work on the HV System. Checking across the Live busbar and feeder spouts using an Approved voltage indicator is only permitted where none of the other described methods in OPSAF-12-004 are reasonably practicable.

Additionally, OPSAF-12-005 which covers the use of Approved HV Voltage Indicators and phasing-out devices has also been updated. This procedure now requires that when proving not live or phasing-out on spouts of withdrawable switchgear, Approved bent-end adapters are a SHALL requirement on HG12 and other vertically withdrawable 11kV switchgear, whilst bent end adapters / extension pieces shall where reasonably practicable be used on all other withdrawable switchgear. The HV indicator shall be dismantled and the probes, extension pieces and bent-end adapters shall be cleaned using the cleaning kit supplied with the instrument.

OPSAF-12-005 now also requires that before inserting any test instrument into switchgear spouts, the circuit breaker moving portion and spouts shall where practicable be inspected for evidence of distress to the bushings and contacts such as burning, arcing or soot deposits. The necessary PPE that shall be worn when carrying out these tests is detailed in section 10.2.3 of OPSAF-12-005.

#### **REMEDIAL ACTION**

This SOP has now been lifted. No further remedial action is required.

