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# NATIONAL SAFETY INSTRUCTION

## **UK BP/SE/NSI 3 HIGH VOLTAGE METALCLAD SWITCHGEAR WITH SPOUTS**

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## HIGH VOLTAGE METALCLAD SWITCHGEAR WITH SPOUTS

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## 1 SCOPE

This National Safety Instruction applies the principles established by the Safety Rules to achieve **Safety from the System** for personnel working on the busbar, voltage transformer and feeder spouts of **High Voltage (HV)** metalclad switchgear. It also covers working on a fault-making device or a circuit-breaker when removed from its service position.

## 2 DEFINITIONS

For the purposes of this document the following definitions apply

*Danger Notice* – An **Approved** notice reading 'Danger'.

*Metalclad Switchgear Movable Earths* – Portable **Primary Earths** applied to metalclad switchgear spouts before a **Permit for Work** is issued. These earths can be removed and replaced one phase at a time during the work.

Terms printed in bold type are as defined in the Safety Rules.

## 3 EQUIPMENT IDENTIFICATION

**Equipment** on which work is to be carried out must be readily identifiable. Where necessary a means of identification must be fixed to it which will remain effective throughout the course of the work.

## 4 DANGERS

The main **Dangers** to personnel working on metalclad switchgear are electric shock or burns, arising from

- the application of **Earthing Devices to Live Equipment**
- the incorrect sequence and method of application or removal of **Earthing Devices**
- gaining access to **Live** conductors.

## 5 BUSBAR SPOUTS OF A MULTI-PANEL SWITCHBOARD

### 5.1 WORK WITHOUT USING METALCLAD SWITCHGEAR MOVEABLE EARTHS

When work is to be carried out on the busbar spouts without using *Metalclad Switchgear Movable Earths*, the following must be carried out in strict sequence

- a) the section of busbars on which work is to be carried out must be **Isolated** from all points of supply from which it can be made **Live**, including any voltage transformers. **Points of Isolation** must then be established

- b) where duplicate switches in one tank or on-load busbar selector isolators are installed, and it is impossible to isolate them from all points of supply, then all switches that can be closed on to the busbars on which work is to be carried out must be rendered inoperative by having their mechanisms **Locked** in the open position
- c) the shutters of spouts, which are, or may become, **Live** must be **Locked** shut. Shutters of spouts on which work is not to be done must also be **Locked** shut except for the busbar spouts at which the **Primary Earths** are to be applied
- d) **Primary Earths** must be applied, as detailed in National Safety Instruction NSI 2, on the busbars at a panel other than that on which work is to be carried out. Inserting the hand or any tool into contact spouts for this purpose is strictly forbidden. Where reasonably practicable, all **Primary Earths** must be **Locked** in the **Earthed** position
- e) **Danger Notices** must be attached where applicable on or near to the **Live Equipment** at the limits of the work area
- f) a **Permit for Work** must be issued
- g) work on the busbar spouts must be carried out under the **Personal Supervision** of a **Competent Person** who must prove each spout **Dead** by means of an **Approved** voltage indicator immediately before the spout is worked on. The Voltage indicator must be tested immediately before and after use
- h) If it is necessary to carry out work on the spouts of the panel on which the **Primary Earths** have been applied, then after work on the available busbar spouts has been completed, the **Permit for Work** must be cleared and cancelled. The **Primary Earths** must be removed and replaced on the busbar spouts of another panel on the same section of busbar. The procedure described in (e), (f) and (g) above must be carried out.

## 5.2 WORK USING METALCLAD SWITCHGEAR MOVABLE EARTHS

When work is to be carried out on the busbar spouts using *Metalclad Switchgear Movable Earths*, the following operations must be carried out in strict sequence

- a) the section of busbars on which work is to be carried out must be **Isolated** from all points of supply from which it can be made **Live**, including any voltage transformers. **Points of Isolation** must then be established
- b) where duplicate switches in one tank or on-load busbar selector isolators are installed, and it is impossible to isolate them from all points of supply, then all switches that can be closed on to the busbars on which work is to be carried out must be rendered inoperative by having their mechanisms **Locked** in the open position
- c) the shutters of spouts which are, or may become **Live** must be **Locked** shut. Shutters of spouts on which work is not to be done must also be **Locked** shut except for the busbar spouts at which the **Primary Earths** are to be applied
- d) **Primary Earths** must be applied, as detailed in National Safety Instruction NSI 2, on the busbars at a panel other than that on which work is to be carried out. Inserting the hand or any tool into contact spouts for this purpose is strictly forbidden. Where reasonably practicable, all **Primary Earths** must be **Locked** in the **Earthed** position

- e) *Metalclad Switchgear Movable Earths* must be applied by a **Senior Authorised Person** to all phases on the busbar at the points of work
- f) *Danger Notices* must be attached where applicable on **Equipment** at the limits of the work area
- g) a **Permit for Work** must be issued
- h) to enable the work to be carried out, the **Competent Person** may remove the Metalclad Switchgear Movable Earths one phase at a time. Each phase earth so removed must be replaced by the **Competent Person** before another phase earth is removed
- i) if it is necessary to carry out work on the spouts of the panel on which the **Primary Earths** have been applied, then after the work on the available busbar spouts has been completed, the **Permit for Work** must be cancelled. The **Primary Earths** must then be removed and replaced on the busbar spouts of another panel on the same section of busbar. The procedure described in (e), (f), (g) and (h) above must then be carried out.

## 6 FEEDER SPOUTS, VOLTAGE TRANSFORMER SPOUTS AND SINGLE PANEL BUSBAR SPOUTS

### 6.1 WORK WITHOUT USING METALCLAD SWITCHGEAR MOVABLE EARTHS

When work is to be carried out on feeder spouts, voltage transformer spouts and single panel busbar spouts without using *Metalclad Switchgear Movable Earths*, the following operations must be carried out in strict sequence

- a) the spouts on which work is to be carried out must be **Isolated** from all points of supply from which the spouts can be made **Live**. **Points of Isolation** must then be established
- b) the shutters of spouts which are, or may become **Live** must be **Locked** shut. Shutters of spouts on which work is not to be done must also be **Locked** shut
- c) **Primary Earths** must be applied, as detailed in National Safety Instruction NSI 2, to the circuit at each point of work and at all **Points of Isolation** except where a **Point of Isolation** is on the **Low Voltage** connection of a transformer. Inserting the hand or any tool into contact spouts for this purpose is strictly forbidden. If reasonably practicable, all **Primary Earths** must be **Locked** in the **Earthed** position
- d) when the **Primary Earths** would prevent access to the point of work, then before a **Permit for Work** is issued alternative **Primary Earths** must be applied as close as is reasonably practicable to the point of work. If this cannot be achieved, then whilst this work is in progress no other work must be carried out on the circuit connected to the spouts being worked on.

Where the spouts are connected to a circuit on which there is any likelihood of induced voltages occurring, **Drain Earths** must, where reasonably practicable, be connected at the nearest point to the point of work where access to the conductors can safely be obtained

- e) *Danger Notices* must be attached where applicable on **Equipment** at the limits of the work area
- f) a **Permit for Work** must be issued

- g) work on the spouts must then be carried out under the **Personal Supervision** of the **Competent Person** who must prove each spout **Dead** by means of an **Approved** voltage indicator immediately before the spout is worked on. The voltage indicator must be tested immediately before and after use.

## 6.2 WORK USING METALCLAD SWITCHGEAR MOVABLE EARTHS

When work is to be carried out on the feeder spouts, voltage transformer spouts and single panel busbar spouts using *Metalclad Switchgear Movable Earths*, the following operations must be carried out in strict sequence

- a) the spouts on which work is to be carried out must be **Isolated** from all points of supply from which the spouts can be made **Live**. **Points of Isolation** must then be established
- b) the shutters of spouts which are, or may become, **Live** must be **Locked** shut. Shutters of spouts on which work is not to be done must also be **Locked** shut
- c) **Primary Earths** must be applied, as detailed in National Safety Instruction NSI 2, to the circuit at each point of work and at all **Points of Isolation** except where such **Points of Isolation** are on the **Low Voltage** side of a transformer. Inserting the hand or any tool into contact spouts for this purpose is strictly forbidden
- d) on the feeder, voltage transformer or busbar spouts on which work is to be carried out, the **Primary Earths** must be replaced by *Metalclad Switchgear Movable Earths*
- e) if there are no other **Primary Earths** left on the circuit connected to the spouts being worked on, then while this work is in progress, no other work must be carried out on that circuit. Where the spouts are connected to a circuit on which there is any likelihood of induced voltages occurring. **Drain Earths** must, where reasonably practicable, be connected at the nearest point to the point of work where access to the conductors can safely be obtained
- f) *Danger Notices* must be attached where applicable on **Equipment** at the limits of the work area
- g) a **Permit for Work** must be issued
- h) to enable the work to be carried out the **Competent Person** may remove the *Metalclad Switchgear Movable Earths* one phase at a time. Each phase earth so removed, must be replaced by the **Competent Person** before another phase earth is removed.

## 7 WORK ON A FAULT-MAKING DEVICE OR CIRCUIT BREAKER

- 7.1 When work is to be carried out on a fault-making device or a circuit breaker which has been removed from its service position and electrically discharged, and transported to a workshop or similar area, the formal requirements of the Safety Rules do not apply.

- 7.2 If the work is to be carried out in a switchroom, the shutters of any available busbar feeder or other spouts which are, or may become, **Live** must be **Locked** shut. If a **Senior Authorised Person** decides it is necessary to confirm instructions in writing he must issue a **Limited Access Certificate** or if required by the work specification a locally issued **Permit for Work**.

Guidance: the locking off of shutters for any busbar, feeder or other spouts for this work are not to be considered as **Points of Isolation**, but as a physical barrier to avoid **System** derived hazards. Therefore a statement in section 2 of the **Safety Document** under 'Further precautions to be taken to avoid **System** derived hazards' should be included e.g. (circuit name and breaker number) busbar and feeder shutters locked shut. The keys for any shutters should be held in safe custody