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BRITISH STANDARD CODE OF PRACTICE

B.S. 1086 : 1942 *O Amcl*

MAINTENANCE OF ELECTRICAL SWITCHGEAR

THIS BRITISH STANDARD having been approved by the Electrical Industry Committee and endorsed by the Chairman of the Engineering Divisional Council was published under the authority of the General Council on 10th December, 1942.

In order to keep abreast of progress in the industries concerned the British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the Committees charged with the revision of the Standards to which they refer.

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BRITISH STANDARDS INSTITUTION

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BRITISH STANDARD CODE OF PRACTICE FOR THE
MAINTENANCE OF
ELECTRICAL SWITCHGEAR
INCLUDING SAFETY OF PERSONNEL AND OF EQUIPMENT

CONTENTS

	Page
1. Scope	2
2. General	3
3. Safety of Personnel	3
4. Safety of Equipment	6
5. Equipment	7
6. Apparatus	7
7. Protective Systems and Apparatus	13
8. Insulation Testing for the Detection of Incipient Breakdown	15

SECTION 1. SCOPE

1. Electrical switchgear, by the nature of the service it renders, does not automatically make any call for that maintenance attention which, nevertheless, is necessary to ensure its efficient functioning at all times. Its normally quiescent condition does not draw attention to incipient faults nor to the dangers resulting from general neglect.

It follows therefore that only a regular and organised scheme of maintenance work, planned to cover all its details, can ensure continued satisfactory operation with minimum of liability to faults and interruptions of supply.

The purpose of this code of practice is to provide in convenient form a record of those matters which experience has shown to be of importance in keeping electrical switchgear and its auxiliary devices (see B.S. 162, Electric Power Switchgear) in good working condition. Attention is drawn to the precautions which should be observed in order to secure safety of personnel while maintenance or reconditioning work is in progress. Some comments are made also regarding safety of equipment and precautionary measures to minimise hazards to plant and service. Finally a few notes are given on the subject of testing as a means for detecting insulation weaknesses which may be developing in switchgear equipments.

The application of this code of practice to Motor Control Gear coming within the scope of B.S. 587 (Motor Starters and Controllers), B.S. 140 (Liquid Starters and Controllers) and B.S. 775 (Contactors), was

not envisaged by the drafting Committee and it should be appreciated that the conditions under which gear of this description operates and the characteristics of the gear itself, are quite distinct from those obtaining for switchgear of the types dealt with in this code.

NOTE. Attention is drawn to the memorandum by the Senior Electrical Inspector of Factories on the Electricity Regulations (made under the Factory and Workshop Acts, 1901-1929, and applicable to premises under the Factories Act, 1927) published by H.M. Stationery Office (Form 928). Publication temporarily suspended.

Where reference is made to "Regulations" in the following recommendations it is the Electricity Regulations given and commented upon in the above memorandum to which reference is made.

SECTION 2. GENERAL

2. The preparation of a maintenance scheme for switchgear will properly commence with a general review of the system with its division into sections where necessary, allocation of staff and the preparation of programmes and time-tables to cover the required operations in detail; and finally a recording or logging system which reports on work done and calls attention to anything out of the ordinary.

The Electricity Supply Regulations, 1937, for securing the safety of the Public and Insuring a Proper and Sufficient Supply of Electrical Energy with certain minor exceptions apply to all electricity undertakings, and on premises constituting a factory* under the Factories Act, 1937, the requirements of the Electricity Regulations must be met.

Form 928,† Memorandum by the Senior Electrical Inspector of Factories on the Electricity Regulations, is a very useful commentary on the subject and should be available to those responsible for maintenance work.

The fact that switch rooms or houses are often kept locked up is frequently responsible for their use as stores for various articles quite unrelated to their function. Such a practice should not be permitted as it infers access by unauthorised persons, increases fire-risk, militates strongly against cleanliness and order and may even impede proper ventilation.

Tools and instruments for maintenance work should be properly housed in racks or cupboards and, if of a special character, their purpose should be clearly indicated. The tools and instruments should be regularly checked against an inventory of the apparatus.

Most manufacturers provide instruction books which set out clearly the manner in which the apparatus functions, the methods of adjustment and how maintenance attention should be given. Such books should be available to the maintenance staff, and, in every switchroom, receptacles should be provided for their safe keeping together with the inventory of tools and instruments.

SECTION 3. SAFETY OF PERSONNEL

3. Generally the responsibility in a factory for the safety of anyone dealing with electrical apparatus rests with the occupier of the premises in

*An electricity station or substation is generally a 'factory.'

† Publication temporarily suspended.

which such apparatus is installed, although in certain circumstances responsibility may also be attached to a contractor or person employed (see Factories Act, 1937, and Electricity Regulations). Suitable measures to guard against danger should, therefore, be covered by rules which must be carried out wherever work is to be done. It is a sound practice to provide permit cards authorising such work as may be required on or near parts which may be alive. An example of how such cards might be worded is given on page 5 and the following paragraphs describe the method of use.

NOTE. It is appreciated that other methods may be equally effective, and that suitable rules are in force in many undertakings; for example, the rules used by the Central Electricity Board have been found by experience to operate efficiently.

4. (a) The person* on whom responsibility for safety rests must be definitely nominated, and also any other to whom the responsibility may be delegated.

(b) Only such nominated persons should be authorised to issue permit cards.

(c) Each permit card, when issued, should be stamped with a serial number. The permit will be handed to the person carrying out, or in charge of, the work and retained by him until the work is completed or stopped.

(d) When work is completed or stopped, the section of the permit indicating this should, after the action stated has been taken, be signed by the person to whom it was issued, and returned to the person responsible for issue. The equipment referred to in the permit must not again be made alive until the card has been surrendered to the person by whom it was issued, and cancelled by him.

(e) In view of the fact that completely isolated equipment may be made alive at any time by electrostatic or electromagnetic induction, and in view of the dangers attending the earthing of equipment which is alive by direct connection or by electromagnetic induction, it is recommended that consideration be given to the use of a suitable form of live line detector of a type which provides the necessary discrimination.

5. It is a good plan to prepare a note of general safety regulations which may conveniently be printed on the back of the permit card. The following is an example:—

'Any switches or control gear, whether local or remote, which could possibly make alive gear on which work is being carried out should be locked in the "OFF" position and the key retained by the authorised person. Danger notices should be suitably placed to indicate the reason for this precaution. Such notices should be posted by the authority issuing the permit and removed by him when finished with, no other person being allowed to interfere with them in any way.'

* See Regulations 28 and 31 and clauses headed 'Duties' of Electricity Regulations.

EXAMPLE OF PERMIT CARD

No.

Permit to work on Electrical Equipment normally alive

This permit must be handed to the person in charge of the work and retained by him until the work is completed or stopped. The equipment must not be again made alive until this card is surrendered to the person issuing it and cancelled by him.

Issued to on at m.

Authorising the following work

Method of making dead

Method of earthing (Sketch diagram to be made if necessary)

Danger notices posted

Nearest points alive

Issued by on at m. Received by

Cancellation of Authority to Work

This is to certify that the above work is completed and all tools including temporary earthing connections removed ready for making alive, and that all men engaged on the work have been warned that it is no longer safe to touch the equipment.

Signed Date Time

This permit to work is hereby cancelled.

Signed Date Time