

American Standard Guide for the Operation and Maintenance of High Voltage Disconnecting Switches

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This publication is one of a series of American Standards (C37.30 through C37.35) on High Voltage Air Switches, Insulators and Bus Supports.

Foreword

(This Foreword is not a part of American Standard Guide for the Operation and Maintenance of High Voltage Disconnecting Switches, C37.35-1962.)

Several years ago, it became apparent that there was a need for coordination of the existing standards on high voltage switches, insulators and bus supports.

In the past, these standards had been independently developed and published by the American Institute of Electrical Engineers and by the National Electrical Manufacturers Association. In 1955, a subcommittee on high voltage switches was organized and was assigned the task of drafting a coordinated group of standards to be published as American Standards.

Since then, this subcommittee has worked in close cooperation with the cognizant AIEE and NEMA committees to prepare the following group of six standards in the field of high voltage air switches, insulators and bus supports:

- (1) American Standard Definitions and Requirements for High Voltage Air Switches, Insulators and Bus Supports, C37.30-1962
- (2) American Standard Electrical and Mechanical Characteristics of Indoor Apparatus Insulators, C37.31-1962
- (3) Schedules of Preferred Ratings for High Voltage Air Switches, C37.32†
- (4) American Standard Rated Control Voltages and Their Ranges for High Voltage Air Switches, C37.33-1962
- (5) American Standard Test Code for High Voltage Air Switches, C37.34-1962
- (6) American Standard Guide for the Operation and Maintenance of High Voltage Disconnecting Switches, C37.35-1962

Suggestions for improvement gained in the use of this standard will be welcomed. They should be sent to the American Standards Association, Incorporated, 10 East 40th Street, New York 16, N. Y.

†C37.32 is being developed by Sectional Committee C37 and when approved will be published as part of this group.

Introduction

High voltage disconnecting switches are assigned certain ratings by the manufacturer and standard tests are conducted to assure the user that the switch, when new, will perform within the ratings shown on the nameplate. It should be recognized that the switch in service will perform within these ratings only if properly operated and maintained. It cannot be stressed too strongly that prescribed safety rules should be adhered to at all times when operating or maintaining high voltage disconnecting switches near energized equipment or conductors.

35-1. Scope

This standard presents suggestions on operation and maintenance as an aid in obtaining satisfactory performance of high voltage disconnecting switches.

35-2. Operation

High voltage disconnecting switches, grounding switches, and horn gap switches are given no interrupting rating,¹ and the following general rules should be followed:

35-2.1 Prior to operating, check the circuit to see that no load is being carried by the switch.

35-2.2 Switches should be closed rapidly.

35-2.3 After operating a switch, check to see that it is fully closed and latched or fully open, as intended.

35-2.4 Do not use undue force in attempting to operate a switch. The operating mechanism is designed properly for the switch and any undue force, in the nature of an extension of the operating han-

¹It is common practice to use these devices to interrupt small values of current such as the charging current of a short length of transmission or distribution line, transformer magnetizing current, or light load current. It should be recognized that such operation results in unconfined electric arcs at the switch contacts which under unfavorable conditions may cause damage to the switch, and which may involve adjacent phase conductors or supporting structure in the initiation of system faults. Transfer switching in parallel or loop circuits also has the same attendant hazards. If current interruption is contemplated, care should be taken to be sure that the current magnitude is in a range that can be handled by the switch with a good probability of successful interruption. References [1] and [2] on page 2 provide valuable information on this subject.

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dle, an extra person on the operating handle or switch stick, may cause severe damage to the switch or mechanism. A few sharp raps on the vertical operating pipe or suddenly applied tugs on the operating handle may help to free an iced switch mechanism.

35-2.5 Power-operated switches should be operated periodically to ensure that the switches and their mechanism and control features are functioning properly. Where the circuit conditions will not permit operating the switch energized and the circuit cannot be de-energized for this purpose, it is suggested that arrangements be made to disengage the operating mechanism from the linkage to allow the control circuits and mechanism to be checked, provided that this method does not adversely affect the over-all adjustment.

35-3. Maintenance

High voltage disconnecting switches are not equipped with isolating devices allowing them to be serviced at frequent intervals. This does not indicate, however, that care or inspection is unnecessary. The frequency of inspection will depend on the atmospheric conditions at a given switch location, the frequency of operation, etc, and shall be determined by the user. In noncorrosive atmospheres, a switch may operate satisfactorily for many years without attention, while in a severe atmosphere such as encountered at some power plants and industrial sites, maintenance may be required in a matter of months. If it is known that a switch has carried heavy short-circuit current, special efforts should be made to inspect it at the earliest possible time, since the ability of the switch to carry rated load current or fault current may be seriously impaired if the contacts are not properly maintained.

Where periodic maintenance of any kind cannot be made, it should be recognized that the life of the switch may be affected. In this case, when a switch operation is made, it is suggested that the switch be opened and closed several times instead of just once in order to clean the contacts and free the moving parts more effectively. A visual inspection of a switch when wet from rain or snow might indicate hot spots which are possible sources of trouble.

The following recommendations require special consideration:

35-3.1 Be sure that the switch is disconnected from all electric power sources before servicing.

35-3.2 After power has been disconnected from the switch, ground leads or their equivalent should be attached to both sides of the switch. Such grounding may be unnecessary in the case of low voltage switches that can be visibly isolated from energized conductors by other disconnecting means.

35-3.3 Inspect insulators for breaks, cracks, or burns. Clean the insulators where abnormal conditions such as salt deposits, cement dust, or acid fumes prevail. This is necessary to avoid flashover as a result of the accumulation of foreign substance on their surfaces.

35-3.4 Inspect contacts for alignment, pressure, burns, or corrosion. Replace pitted or badly burned contacts. If pitting is of a minor nature, smooth down the surface with clean, fine sandpaper (not emery) or as manufacturer recommends.

35-3.5 Check blade lock or latch for adjustment.

35-3.6 Inspect interphase linkages, operating rods, levers, bearings, etc, to make sure that the adjustments have not changed or that the pipes are not bent. Clean and lubricate only if recommended by the manufacturer. Check for simultaneous closing of all blades and for complete contact in the closed position. Check gear boxes for moisture which could cause corrosion or difficulty in operating the switch due to ice formation. Inspect flexible braids or slipping contacts commonly used for grounding the operating handle. Replace braids showing signs of corrosion, wear, or broken strands.

35-3.7 Inspect over-all switch for good working conditions. See that bolts, nuts, washers, cotter pins, and terminal connectors are in place and in good condition. Replace items showing excessive wear or corrosion.

35-3.8 When a switch cannot be disconnected from power, hot-stick servicing may be used to as great an extent as possible.

35-3.9 Power-operating mechanisms attached to high voltage disconnecting switches are usually of the motor-driven, hydraulic, or pneumatic type. The maintenance instructions of the particular manufacturer of each mechanism should be followed. In addition, check limit switch adjustment, associated relay equipment for poor contacts, burned out coils, inadequate supply voltage, and any other conditions that might prevent the proper functioning of the complete switch assembly.

References

- [1] ANDREWS, F. E.; JAMES, L. R.; ANDERSON, M. A. Interrupting ability of horn-gap switches. *American Institute of Electrical Engineers Transactions*, vol 69, 1950, part II, pp 1016-1027.
- [2] A Committee Report on Transformer Magnetizing Current and Its Effect on Relaying and Air Break Switch Operation. *American Institute of Electrical Engineers Transactions*, vol 70, 1951, part II, pp 1733-1740.