ELECTROLYTIC CAPACITORS
100 AND 101 TYPES
METHOD OF OPERATION

1. GENERAL

1.01 This section describes the method of operating the 100-A, 100-B, 100-C, 100-D, 101-A and 101-B types of electrolytic capacitors per KS-2660, KS-3136, KS-6310, KS-6381, KS-7093 and KS-6448 and outlines the general troubles which may be encountered in the operation of these electrolytic capacitors.

1.02 Reference shall be made to the section covering the Apparatus Requirements and Adjusting Procedures for information necessary for the proper maintenance of apparatus referred to herein.

2. OPERATION

2.01 The operation of the electrolytic capacitor is entirely automatic and should require no attention other than periodic inspection. It is not expected that additional fluid or oil will be needed during the life of the capacitor.

2.02 The capacitor must be operated only in direct current circuits of not more than the rated potential as determined by the code number appearing on the capacitor cover. It is permissible to have an a-c voltage superimposed on the d-c voltage provided the maximum instantaneous resulting voltage does not exceed the maximum rated voltage of the capacitor and the minimum instantaneous voltage is not negative. Under this condition the alternating current shall not exceed the maximum rated alternating current carrying capacity of the capacitor. The terminal marked + should be connected to the positive potential and the terminal marked − should be connected to the negative potential of the circuit. If the capacitor is subjected to d-c potentials and is not connected correctly large direct currents may flow and the capacitor will act like a liquid rheostat. If this action continues, a film may be formed on the negative plates and the effective capacitance of the capacitor thereby reduced until reformed in the proper direction. Capacitors may be connected in series in circuits having potentials higher than the rated d-c voltage for a single capacitor provided a resistance is connected in parallel with each capacitor to equalize the voltage drop across each unit.

2.03 The film which is formed on the positive plates will deteriorate if there is no voltage impressed across the cell for a considerable period such as several days, the time being less as the temperature is increased. Since the capacitor passes a very small current there is only a slight loss in keeping it continuously connected to a circuit of normal potential and it is much better for the capacitor to be so connected at all times. Although a capacitor of this type might be left out of the circuit for a few days or even a week without serious damage to the film, such an occurrence should be avoided. If it is found necessary to leave the capacitor disconnected from its circuit for periods greater than one week the film should be kept in condition by connecting the capacitor across a circuit of normal operating voltage for one or two hours at least once each week that the cell is out of service. For the higher operating voltages and temperatures it is desirable to connect the capacitor across the circuit more frequently. When a capacitor is operated at temperatures substantially greater than 105° F., or when it has remained disconnected from the circuit for too long a period, the film on the positive plates deteriorates and in some cases may be entirely ineffective. In this condition the capacitor will gas freely and heat up when connected in the circuit or may even blow the fuses when potential is first applied. When reconnecting a capacitor which has been off circuit for more than a day it is recommended that a series resistance be used as outlined in the associated section covering the Apparatus Requirements and Adjusting Procedures.

2.04 The fluid level will not fall appreciably because of decomposition, while evaporation is prevented by the layer of oil and the sealed cover. The fluid in operating capacitors should ordinarily remain satisfactory for the life of the capacitor with no attention other than routine inspection, the time varying greatly with the average temperature of operation. A range of 40° F. to 105° F. is permissible and will not normally be exceeded in power plant equipment or battery rooms. Longer life may be expected if the capacitor does not have to operate for prolonged periods at temperatures higher than 80° F.

2.05 After the capacitor fluid has been in service for a period of time it may turn milky-white or even get a white jelly-like precipitate settling in the bottom of the container. This does not harm the capacitor even though it comes in contact with the plates of opposite polarity, as the precipitate is of very high resistance and as long as the capacitor does not heat up it may be kept in service. With capacitors manufactured during recent years very little corrosion of plates is experienced unless impurities are introduced into the capacitor fluid. Should such corrosion occur a check as to operating conditions should be made and any improper condition remedied. It is ordinarily inadvisable to do any work on the inside of the capacitor since more trouble may be introduced than that which it is sought to correct. Capacitors with discolored fluid or with corroded plates ordinarily have substantially full capacity and may continue to serve satisfactorily for many years.

2.06 The fluid provided in the No. 1-A and No. 2-A capacitor filling units freezes at approximately 32° F. and therefore in installations where temperatures lower than this will be encountered provision must be made to furnish No. 1-B capacitor filling units in place of the No. 1-A or No. 2-A filling units. Up to this date it has not been found necessary to code a non-freezing capacitor filling unit in the 1 quart size equivalent to the No. 2-A filling unit. The No. 1-B, 3 gallon unit is sufficient for eight 101 type capacitors. The fluid provided in the No. 1-B capacitor filling unit freezes at a lower temperature but does not freeze entirely solid so it will not damage the capacitor other than to reduce its capacity and increase its resistance during the frozen period. If the capacitor temperature gets lower than 12° F. the effective capacitance is temporarily reduced to less than half the capacitance at 32° F. In this event it will probably be necessary to make supplementary arrangements to maintain capacitance by other means where the capacitors are depended upon to reduce cross-talk or noise.

3. GENERAL TROUBLES

3.01 *Crystallization of Capacitor Fluid*

CAUSE	ACTION
Temperature of capacitor fluid lowered to freezing point when using No. 1-A or No. 2-A (indoor) filling unit.	Warm room or report condition to supervisor.

3.02 *Heating of Capacitor Solution*

CAUSE	ACTION
Deterioration of film.	Check circuit for voltage and polarity. Reform film if necessary.
Poor ventilation in battery room.	This condition should be corrected or reported to supervisor.
Alternating current rate higher than continuous rating for long periods.	Check for and remedy any abnormal local condition causing trouble or report trouble to supervisor.

3.03 *Deposits in Capacitor Fluid*

CAUSE	ACTION
Cloudy floating precipitate or white jelly in bottom of jar.	This usually occurs after a period of service particularly when warm. No action is required.

3.04 *Corrosion*

CAUSE	ACTION
Corrosion of plates.	If impurities get into the solution, plates may be corroded. Usually this stops when impurities have been used up. If all supporting lugs of either polarity should be corroded through, replace capacitor.
Short-circuiting of plates.	The granular deposits from corroded plates are of high resistance. If they become excessive so plates are bent out of place into a metallic contact which causes excessive current to flow, replace capacitor. It is not expected that this will happen in capacitors equipped with porcelain spacers.

3.05 *Loss of Capacity in Capacitor*

CAUSE	ACTION
Poor connections.	Check connections.