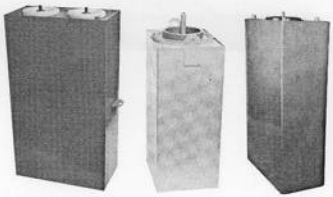
TYPE CJE ENERGY DISCHARGE CAPACITORS



PRIMARY USES

These low inductance energy storage capacitors are designed for high energy, fast discharge applications such as: nuclear research, high temperature research, plasma generators, arc discharge, ballistic accelerators, exploding wires, ion propulsion, hypersonic wind tunnels, metal forming and in other phases of magneto-hydrodynamics.

DESCRIPTION

This capacitor has been designed and manufactured for continuous oscillatory discharging. It is constructed of multi-layers of high density Kraft paper impregnated with castor oil.

The capacitor sections are of extended foil construction. The entire current path of the capacitor has been designed not only to withstand the high amperage, but also to withstand the mechanical shock of discharge. The capacitor has been geometrically designed for magnetic field cancellation which affords an extremely low inductance capacitor.

STORED ENERGY

Energy discharge capacitors may be used individually or in banks ranging up to several million joules. The stored energy in joules (or watt-seconds) in a capacitor, or in a bank of capacitors is given by

$$\text{Joules} = \tfrac{1}{2} CE^2$$

Where: C = total capacitance in farads
E = potential to which capacitor is charged in volts.

CONSTRUCTION

CASES

The rectangular cans are fashioned of heavy gauge steel which is heli-arc welded to insure maximum strength and durability, and they are finished in a high quality gray enamel paint.

TERMINALS

A special low inductance terminal is used on Type CJE Energy Discharge Storage Capacitors. O-ring seals at both the stud and terminal for mounting within the cover assure a leak-proof capacitor that will withstand the heavy shocks during the discharge cycle.

DIELECTRICS

The capacitor is designed and manufactured to withstand the highest voltage with maximum safety. It features multi-layers of high density Kraft paper which is impregnated with a specially processed castor oil.

VOLTAGE REVERSAL

The voltage on the first reversal will be:

$$E_r = E\epsilon^{-\frac{\pi R}{2}\sqrt{\frac{C}{L}}}$$

Where: E r is the peak value of the inverse voltage on the first reversal. The value of this voltage is usually expressed as a percentage of the charging voltage.

The life of the capacitor is adversely affected by the amount of the voltage reversal and it is important to limit the reversal as much as possible. This can be done by increasing the circuit resistance but unfortunately this limits the peak current. Crowbar ignitrons can be used to short circuit the capacitor at the time of zero voltage. Ignitrons are limited in the ratings that are available and in many applications a limited life or a capacitor with more dielectric is the only answer.

LIFE EXPECTANCY OF THE CAPACITOR BANK

VOLTAGE STRESS

The life expectancy of a capacitor system is a function of the peak charging voltage applied to the capacitor (see Figure 1). This curve was established under the following parameters.

1. Temperature 25°C.
2. Ringing Frequency 25 KC
3. Voltage Reversal 85%

VOLTAGE REVERSAL

The life expectancy of a capacitor system is, again, a function of the voltage reversal of the system (see Figure 2). This curve was established under the following conditions.

1. Temperature 25°C.
2. Ringing Frequency 25KC
3. Applied Rated Voltage 100%

RINGING FREQUENCY

The life expectancy of a capacitor system is, also, a function of the circuit ringing frequency (see Figure 3).

1. Temperature 25°C.
2. Voltage Reversal 85%
3. Applied Rated Voltage 100%

TEMPERATURE

The maximum temperature range of Types CJE, CJL and CJS capacitors is + 10°C. to + 40°C. (see Figure 4).

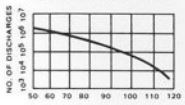


Figure 1

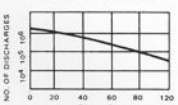


Figure 2

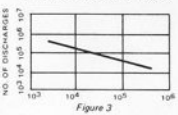


Figure 3

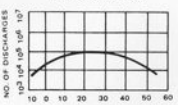


Figure 4

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