

Power Capacitors

COOPER Power Systems

Electrical Apparatus

McGraw-Edison® Type EX-7Li® Single-Phase Internally Fused Units

230-12

McGraw-Edison Type EX-7Li® all-film internally fused capacitors (Figure 1) feature the latest Cooper Power Systems design innovations; extended foil, solderless connections, CLEANBREAK® element fusing system and laser-cut aluminum foil. Designed, manufactured, and tested to meet or exceed the requirements of all applicable ANSI/IEEE and IEC standards, their low cost per kvar makes these capacitors a simple, economical source of reactive power on electric power systems for:

- Power factor correction.
- Voltage support.
- Loss reduction.
- Improving power transfer capability.
- Releasing system capacity.

Internally fused, power capacitors can be installed individually or in factory-assembled switched or unswitched:

- Open style indoor and substation banks.
- Metal enclosed banks.

Note that Cooper Power Systems does not recommend the use of internally fused capacitors on pole mounted, distribution rack applications.

McGraw Edison exclusive all-film, extended foil/mechanically connected capacitors provide:

- Low total losses (0.15 watt/kvar); Low dielectric loss (<0.1 watt/kVar)
- Superior electrical performance and reliability.
- Environmentally acceptable Edisol® ST Non-PCB dielectric fluid.
- CLEANBREAK® element fusing system.

CAPACITOR APPLICATION

Capacitor application requires an evaluation of the power system to determine:

- The kvar requirements.
- The most effective location.
- Interaction with system.
- The necessary protection.

In general, capacitors are installed:

- At the substation, to supply the system kvar needs most effectively.
- At or near the load center, to obtain the optimum kvar supply and voltage correction.
- At the end of the line, to achieve maximum voltage correction.
- In series with a distribution feeder to minimize flicker and provide voltage support.
- In series with a transmission line to minimize the reactance of the line, improving stability and controlling voltage drop.

RATINGS

McGraw Edison capacitors are rated in continuous kvar, voltage, BIL and frequency and are subjected to all applicable ANSI/IEEE or IEC routine tests. The capacitor unit rated voltage is the voltage at rated frequency that can be applied terminal-to-terminal continuously. See the standard to which the capacitor unit is manufactured for guidance in operation above rated voltage.

Single-phase capacitor units are designed to produce rated kvar at rated voltage and frequency within the tolerance of the applicable standard. As the capacitor's kvar output is proportional to the square of the applied voltage, proper application requires attention to the applied voltage.



Figure 1.
The McGraw Edison EX-7Li® single phase internally fused, all-film capacitor

Available capacitor unit ratings can be obtained by contacting the factory.

CONSTRUCTION FEATURES

Construction features of McGraw-Edison power capacitors include:

- CLEANBREAK® element fusing system. Each element is protected with a series connected CLEANBREAK® current limiting fuse. This patented fusing system incorporates the following features:
 - Polymer fuse card provides isolated fuse mounting which prevents potential damage to adjacent capacitor elements and fuses.
 - Fuses are individually mounted within a polymer fuse tube. The tube protects the fuse from damage due to adjacent element failures and fuse operations. This design also requires no

*US Patent 4,633,369

TABLE 1
Bushing Characteristics and Weights

BIL (kV)	Creepage Distance (mm)	Strike Distance (mm)	60-Hz Withstand		Approximate Net Weight/ Bushing (kg)
			60-Sec. Dry (kV)	10-Sec. Wet (kV)	
75**	264	159	35	30	1.4
95	264	159	35	30	1.4
125	461	242	60	50	2.3
125	559	242	60	50	2.3

** Same bushing is used on 75 and 95 KV BIL capacitor units.

Internally fused capacitors are designed based on a specific kvar requirement. For this reason the overall dimensions and weights of the units are not available until the particular unit is designed. Please contact the factory for specific unit dimensions based on your particular kvar requirement.

paper in the fusing dielectric, thereby eliminating the generation of extensive carbon arc by-products in the dielectric fluid. This significantly improves the dielectric performance by preventing fluid contamination and promotes proper clearing of element fuse.

- The CLEANBREAK® fuse operates in a current limiting mode to chop the fault current into the failed element. This prevents the energy stored in the parallel connected elements from being discharged into the fault thus minimizing gassing and damage to the failed element and adjacent dielectric.
- EX® mechanical connection system. Provides solderless internal connections that eliminate localized heating and cold solder joints. The EX crimping system also allows 100% inspection during assembly assuring integrity of internal connections and maximizes operational safety.
- Individual closed loop capacitor fluid impregnation system. Assures superior fluid impregnation and gas molecule evacuation resulting in low infantile failure rates and long lasting electrical performance.
- Stainless steel tank with light-gray finish for resistance to severely corrosive atmospheres. Tank is finished with an epoxy primer and a urethane topcoat coating system. This system has been tested to the ANSI C57.12.31 pole mounted standard and the ANSI C57.12.29 coastal environment standard.
- High stacking factor design utilizing aluminum foil electrodes with a laser-cut active edge. The region of the dielectric exposed to the highest electric field stress is located at the active edge of the electrode. The high stacking factor and laser cut active edge shapes and reduces the electric field stress thereby significantly increasing the discharge inception voltage (DIV). Given their high DIV capability, McGraw Edison capacitors are designed to have the highest safety margin to DIV in the industry.
- Light-gray, wet-process-porcelain bushings; glazed for high strength and durability and hermetically sealed to the capacitor tank. Single piece cover construction provides superior sealing characteristics.
- Stainless-steel mounting brackets with industry-standard 397 mm. mounting centers for unit interchangeability; under-side of each bracket is unpainted to properly establish tank potential.

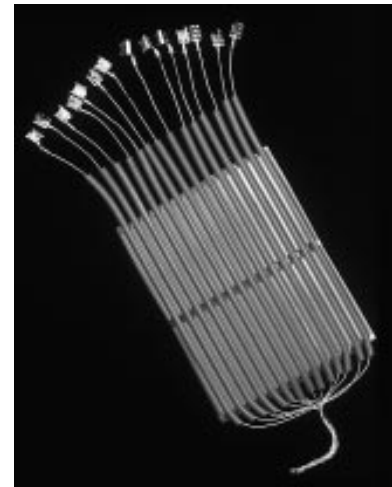


Figure 2.
CLEANBREAK® fuse protection system

- Parallel-groove terminals accommodate copper or aluminum conductors from No. 8 solid to No. 1 stranded. Parallel-groove connectors are supplied on all capacitors sold as individual units.
- Internal discharge resistors that reduce terminal voltage as specified per the relevant ANSI/IEEE or IEC standards.
- Stainless-steel nameplate containing required IEC or NEMA/IEEE data. Nameplate lettering is mechanically scribed to ensure long lasting performance. Nameplate is mechanically secured to the tank ensuring that it will remain in place throughout the life of the capacitor.
- Blue non-PCB decal.

COOPER Power Systems

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