Capacitor Switch

Functional Specification for 15 kV or 25 kV Capacitor Vacuum Switch

1. Scope

1.1. Single-phase, electrically operated vacuum switch with close and latch capability. The Edison Capacitor Switch is intended for application on up to 15.6 kV ungrounded WYE systems or 27 kV solidly grounded WYE systems for the 15 kV rated switch, and 25 kV ungrounded WYE systems or 38 kV solidly grounded WYE systems for the 25 kV rated switch

1.2. This specification shall only cover the purchase and shipment of the switch. The purchaser and/or user shall be responsible for all site-work, electrical connections, and installation.

2. Applicable Standards

2.1. IEEE Std C37.66™-2005 standard – IEEE Standard Requirements for Capacitor Switches for AC Systems (1 kV to 38 kV).
2.2. IEC 62271-103, 2011 – High-Voltage Switchgear and Control gear – Part 103: Switches for Rated Voltages above 1 kV up to and including 52 kV.

3. Ratings

3.1. The switch shall be rated as follows:

Voltage Class	15 kV		25 kV	
Switch Type	ECS15-95	ECS15-125	ECS25-125	ECS25-150
Rated Maximum Voltage, 50/60 Hz				
Ungrounded capacitor banks, L-L (kV)	15.6		25	
Solidly grounded capacitor banks, L-L (kV)	27		38	
Impulse Withstand Voltage				
Line to ground (kV BIL)	95	125	125	150
Open contact kV (BIL)	95	95	125	125
Withstand Voltage, 60 Hz				
Power Frequency Dry Withstand (kV)	60		60	70
Power Frequency Wet Withstand (kV)	50		50	60
Continuous current 50/60 Hz (A)	200 & 400*		200	
Capacitive switching current 50/60 Hz (A)	200 & 400*		200	

Voltage Class	15 kV		25 kV	
Switch Type	ECS15-95	ECS15-125	ECS25-125	ECS25-150
Fault making peak current (A)	15,000		15,000	
Symmetrical fault making current (A)	6,000		6,000	
Withstand peak current (A)	15,000		15,000	
Short-time symmetrical withstand current (A)	4,500		4,500	
High frequency transient making peak current (A)	9,000/12,000		9,000	
Rated transient inrush frequency (Hz)	6,000		6,000	
Creepage Distance				
Terminal to terminal (mm) for 200A	440	600	813**	813
Terminal to ground (mm) for 200A	498	610	610**	813
Operating Voltage Range, 50/60 Hz				
110/120 Vac (V)	75 - 130		75 - 130	
240 Vac (V)	150 - 260		150 - 260	
DC Pulse for Zero Voltage Closing (ZVC)	Contact Manufacturer		Contact Manufacturer	
Continuous DC Supply Voltage	Contact Manufacturer		Contact Manufacturer	
Nominal Control Current				
110/120 Vac for 100 msec (A)	9		9	
240 Vac for 100 msec (A)	6		6	
Weight (lb/kg)	32/14	33/15	33/15	34/16
Operating temperature range	-40 °C to +60 °C		-40 °C to +60 °C	
Mechanical operations	50,000		50,000	
Auxiliary Contact Rating				
110/120 Vac (A)	20		20	
240 Vac (A)	20		20	
110/120 Vdc (A)	0.20		0.20	

*400A continuous current rating available with 15.6kV rated switch only with Open Contact BIL of 125kV.
**400A option utilizes 813mm upper bushing creep with options for 610mm & 813mm lower bushing creeps.

3.2. The switchgear shall have an ambient operating temperature range of -40 ºC to +60 ºC.

3.3. Operating Duty Test (IEEE Std C37.66™-2005 standard, section 6.5)

200 A	400 operations
100 A	400 operations
35 A	400 operations

3.4. Operating Duty Test (IEEE Std C37.66™-2005 standard, section 6.5)

400 A	400 operations
200 A	400 operations
70 A	400 operations

4. Switch Features

4.1. The switch shall be maintenance free. No routine maintenance is required.

4.2. The switch shall be operable in any mounting orientation.

4.3. The switch shall withstand a minimum of 50,000 mechanical operations (one operation equals one open operation plus one close operation).

4.4. 15 kV switch can be designed up to 610 mm terminal to ground creepage. The 25 kV can be a designed up to 813 mm terminal to ground creepage.

4.5. Switch is designed for optional type A, B, or C auxiliary contacts.

4.6. Load side termination ring designed for 360-degree terminations (no need to break seals to rotate head for directional connections). Design also allows for termination of multiple loads.

4.7. Bushing constructed of low viscosity cycloaliphatic epoxy resin. Designed to IEC 60815 SPS class E.

4.8. Tank made from fiberglass reinforced polyester (non-corrosive). Tank bears no structural loading, it is an environmental shield only. Tank contains integrated rain shield and hot stick guide over the manual operating handle.

4.9. Permanent Magnetic Solenoid design for robust mechanical operation (no cams, linkages, struts, or pins). No relays or switching electronics allowed in the body of the switch.

4.10. Optional accessories include bird guards for all terminals, auxiliary contacts, and additional load terminals

4.11. Open/Closed indication integrated into manual operating handle

4.12. Mounting bracket made from type 304 stainless steel.

4.13. Nameplate:

- Catalog Number
- Serial Number
- Rated maximum voltage, kV
- Maximum system voltage with ungrounded capacitor neutral
- Maximum system voltage with grounded system and grounded capacitor neutral
- BIL Rating terminal to terminal
- Creepage terminal to terminal
- BIL Rating terminal to ground
- Creepage terminal to ground
- Rated continuous current, A (RMS)

- Rated AC capacitive switching current (RMS)
- Rated control voltage
- Reference to wiring diagram documentation
- Manufacturer, Date of Manufacture and Location of Manufacture
- Rated short-time symmetrical current
- Rated high-frequency transient making current

5. Certified Design Test Data:

5.1. Certified Design Test per IEEE Std C37.66™-2005 standard, section 6

6. Production Testing - The unit shall be subjected to the following production tests:

6.1. Production test per IEEE Std C37.66™-2005 standard, section7

7. Submittals

7.1. The manufacturer shall furnish instruction manuals covering the installation and operation of the switch.

8. Quality Assurance

8.1. Equipment shall be built in accordance with the industry standards for medium voltage equipment.

8.2. The manufacturer shall be registered and certified as ISO 9001 compliant by a recognized international and independent body.

9. Warranty

9.1. The switch shall be provided with a one-year warranty in-service or18 months maximum from date of shipment.

10. Approved Manufacturers

Eaton