

# Circuit Breaker Maintenance, Molded and Insulated Case

**2 Days, 1.4 CEUs**

Molded and insulated case circuit breakers are the most common low voltage breaker found in any industrial power system. Both of these types of breakers are enclosed in an insulating housing, while an insulated case breaker is simply a molded case breaker with a stored energy mechanism. While both types require testing and maintenance, insulated case breakers can actually be disassembled and adjusted. With proper maintenance, technicians can prevent nuisance trips, and ensure tripping operations execute as required for equipment protection. In addition to improving electrical system reliability, well maintained circuit breakers also minimize the arc flash hazard energy levels that technicians can be exposed to during a fault.

This hands-on course is intended for new or experienced electricians and technicians that install, maintain, repair or troubleshoot molded or insulated case circuit breakers, rated less than 1000 V AC, equipped with thermal, magnetic or solid state tripping devices. The student should have basic knowledge of AC/DC electricity.

## Lab and Classroom Attire

AVO is committed to the personal safety of each participant and requires safety glasses, long pants and ANSI rated “safety-toe” work shoes for lab activities. Lecture courses may involve a tour of a work or shop area and for this reason open-toe shoes and shorts are not considered appropriate attire for the classroom.

## Learning Objectives

To receive 1.4 CEUs, the participant must attend 2 days of class (14 contact hours) and attain a minimum average grade of 80% (overall grade will consist of 50% lab practice and 50% final exam). Upon completion of this course, the participant will demonstrate that he/she is able to:

- Identify circuit breaker components.
- Utilize appropriate personal protective equipment and safe work procedures for breaker maintenance.
- Interpret NEMA breaker maintenance procedures.
- Carry out complete circuit breaker maintenance, removal and restoration procedures.
- Perform and evaluate the results of low resistance, insulation resistance and overcurrent tests.
- Verify operation of the trip device and accessories.

## SCOPE

### Day 1\* (7 contact hours)

- I. Introduction
  - A. Schedule
  - B. Course Outline
- II. Introduction to Molded- and Insulated-Case Circuit Breakers
  - A. The Need for Maintenance
  - B. Technical Literature
- AM Break
- C. Trained Personnel
- D. Spare Parts
- E. Tools

- F. Maintenance Justification
- G. Description of Components
- H. Auxiliary Equipment
- Lunch
- I. Selecting a Breaker
- J. Testing Guidelines
- K. Testing
- PM Break
- L. Insulation Resistance
- M. Contact Resistance Tests
- N. Testing the Auxiliary Equipment
- O. Practical Exercise

### Day 2 (7 contact hours)

- III. Overcurrent Devices
  - A. Overcurrent Testing Procedures
- AM Break
- B. Timing Tests
- C. Operating Principles
- Lunch
- IV. Testing Lab
- PM Break
- V. Conclusion
  - A. Review
  - B. Final Exam

\*Class scheduling times may vary based on discussions and size of class



**STANDARD EQUIPMENT LIST**  
**Circuit Breaker Maintenance, Molded and Insulated Case**  
Course Number: 418, REV 2

REVISED: Feb 2024

BY: C. Marchant

DAYS: 2 DAYS

NOTE: All items indicated with an asterisk (\*) must be supplied by the client on On-Site courses

<b>TEXT ( PER 1 STUDENT )</b>	
<b>QUANTITY</b>	<b>ITEM</b>
1	<i>CIRCUIT BREAKER MAINTENANCE, MOLDED AND INSULATED CASE</i> COURSE NO.418, REV 2, MARCH 2017

<b>MATERIAL (PER STUDENT)</b>	
<b>QUANTITY</b>	<b>ITEM</b>
1	MAGNIFYING SHEET
1	12 INCH CLEAR RULERS
1	RED PENCIL
1	SCIENTIFIC CALCULATOR (TO BE RETURNED W/EQUIPMENT)

<b>MATERIALS NEEDED (PER CLASSROOM)</b>	
<b>QUANTITY</b>	<b>ITEM</b>
*1	PROJECTOR OR TV WITH PROJECTION CAPABILITIES
*1	DRY ERASE BOARD WITH MARKERS AND ERASERS
*10	STUDENT TABLES
*10	STUDENT CHAIRS

<b>TEST EQUIPMENT (PER CLASS)</b>	
<b>QUANTITY</b>	<b>ITEM</b>
1	1kV INSULATION RESISTANCE TESTER (MIT 320)
1	DIGITAL LOW RESISTANCE OHMMETER (DLRO) 10 AMP
1*	PRIMARY INJECTION TEST SET CB-832 OR DDA-1600/EQUIVALENT
1	AC/DC POWER SUPPLY (0-125 AC/DC)
1	M808 CAT III DIGITAL MULTIMETER (DMM)

<b>TOOLS (PER CLASS)</b>	
<b>QUANTITY</b>	<b>ITEM</b>
1	CBMMIC TOOL BOX (LIST ON PAGE 2 OF 2)
1	1 BOX SCOTCHBRITE (GREEN GENERAL PURPOSE)
*1	BOX OR PACKAGE LINT FREE SHOP TOWELS
*1	SPECIAL TOOLS FOR CIRCUIT BREAKER (AS NEEDED)

<b>CIRCUIT BREAKERS (PER CLASS)</b>	
<b>QUANTITY</b>	<b>ITEM</b>
1	30 AMP MOLDED CASE CIRCUIT BREAKER
1	40 AMP MOLDED CASE CIRCUIT BREAKER
1	60 AMP MOLDED CASE CIRCUIT BREAKER
1	MOLDED CASE CIRCUIT BREAKER AUXILIARY DEVICES REQUIRED: AUXILIARY TRIP UNIT SHUNT TRIP AUXILIARY CONTACTS UNDER VOLTAGE TRIP UNIT
(CIRCUIT BREAKERS MUST HAVE INSTRUCTION MANUALS WITH TIME CURVES OR TESTS MUST BE PERFORMED BASED ON NFPA 70B CRITERIA)	

<b>CBMMIC TOOL BOX LIST</b>	
	ALLEN SET (T-HANDLE PREFERRED)
	SCREWDRIVER SET
	3/8 DRIVE SOCKET SET
	ASSORTMENT OF MOLDED CASE C/B PROPS
	WISE GRIPS 2 PAIR
	SCOTCH 33 TAPE
	CHANNEL LOCK PLIERS 1 PAIR
	COMBINATION WRENCHES 5/16 TO 7/8 INCH

FOR VIRTUAL CLASSES:  
CONTENT MATERIAL WILL BE PROVIDED IN DIGITAL FORMAT