



Technician  
Certification

## Candidate **Level 2** Handbook



# Train. **Test.** Certify.

This booklet contains:

- Exam education and experience requirements
- Selected study references
- Certification policies
- Sample exam questions



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# Candidate Level 2 Handbook

## Introduction

### The PEARL Association

The **Professional Electrical Apparatus Reconditioning League (PEARL)** is a professional trade association of companies that supply reconditioned, and remanufactured electrical power equipment, apparatus, and components to the industry. The mission of PEARL is to create a marketable distinction in quality, safety, and integrity for PEARL members in the eyes of their customers. PEARL's members must meet strict technical, safety, and operational requirements; and be committed to the safe reconditioning and remanufacturing of electrical apparatus and equipment that has previously been in service. PEARL sponsors an annual conference and exhibition that can be attended by anyone concerned with the safety and reliability of reconditioned, remanufactured, and recycled electrical equipment and apparatus.

### Why Get Certified?

For employers, the PEARL Technician Certification offers a means to highlight companies that employ certified technicians, providing these firms with a competitive advantage and heightened recognition in the industry. By certifying your technicians, you can boost staff morale, decrease attrition, pave the way for prospective management roles, minimize accidents and related expenses, lessen warranty claims, and enhance the company's overall profitability.

For technicians, PEARL Technician Certification can enhance your career journey, paving the way for new opportunities within your organization. It can foster a deeper sense of professional satisfaction and garner respect from your colleagues, both in the workplace and throughout the broader electrical reconditioning community.

The PEARL Technician Certification Program is an online self-paced program that ensures your technicians get the safety and technical training they need to excel in their careers. Each level of the training has prerequisite modules that must be completed to help prepare the technician for the exam.

The PEARL Technician Certification Program is only available for PEARL Accredited Companies (PAC). PACs are dealer or service members that have passed a rigorous review by a third-party, are peer approved by industry experts, and comply with the PEARL electrical standards: ANSI/PEARL Electrical Equipment Reconditioning Standard (EERS) and the PEARL Inspect & Test Standard.

### Delineation of Certification Levels

The PEARL Technician Certification program was created to offer multi-level technical certification for individuals employed in the reconditioned electrical equipment field. Exams are designed by vocational specialists and span four levels of practice, ranging from the entry-level technician (Level 1) to the supervisory technician (Level 4). Levels 2, 3, and 4 are defined in terms of general experience in the electrical equipment reconditioning business and the complexity of the equipment on which they perform work. The certification design committee developed a general delineation of the levels of certification, which are presented below.

### Level 1 Technician

Level 1 technicians are qualified to work safely within a shop environment and around de-energized electrical power equipment. They recognize and possess a fundamental understanding of the PEARL reconditioning standards. These technicians can identify various types of electrical apparatus, shop equipment, warehouse equipment, test and measurement equipment, and cleaning equipment used in the electrical equipment reconditioning process, all under the supervision of a higher-level technician.

### Level 2

Level 2 technicians can work independently to inspect, test, and perform reconditioning procedures in compliance with PEARL and other industry standards on a wide range of electrical power equipment. They can also accurately interpret equipment drawings, specifications, and electrical schematics at the component level as they relate to the PEARL reconditioning standards.

### Level 3

Level 3 technicians can supervise Level 1 and 2 technicians, conduct, and oversee large equipment reconditioning projects, work safely in the field around energized electrical equipment, develop equipment test plans and analyze test results, plan and lead jobs, evaluate shop safety plans, and provide training to others.

### Level 4

Level 4 technicians can manage multiple individuals and projects, conduct complex metering and protection projects, make recommendations on power system diagnostic testing and corrective actions, and evaluate electrical equipment modifications and upgrades for adherence to PEARL and industry standards.

## PEARL Technician Profile

This certification program is intended for technicians who are engaged in inspection, reconditioning, and/or remanufacturing, testing, periodic maintenance of electrical power equipment and evaluation of such equipment for acceptance for service, continued serviceability, or required maintenance.

|   | <u>Level 1</u>   | <u>Level 2</u>   | <u>Level 3</u>                         | <u>Level 4</u>         |
|---|------------------|--|--|------------------------|
| <b>Technician Title:</b>                    | Entry Technician | Journey Technician   | Lead Technician                        | Supervisory Technician |
| <b>Certified Specialist Requirement:</b>    | Not Applicable   | Level 1 certificate  | Level 2 certificate                    | Under development      |
| <b>Education:</b>                           | None             | Same as Level 1  | Same as Level 1                        | Same as Level 1        |
| <b>Training:</b>                            | None             | 20 hours of safety training<br>40 hours of electrical training | Additional 24 hours of safety training | Under Development      |
| <b>Experience:</b>                          | None             | 2 years  | 5 years                                | 10 years               |
| <b>Technical Essential Duties Category:</b> | Level 1 Duties   | Level 2 Duties   | Level 3 Duties                         | Level 4 Duties         |

## The Certification Process

### Step One – Complete the Online Technician Application

To become certified, all applicants must complete an online certification application. The application verifies an applicant's work experience and qualifications. PEARL certification mandates that applicants be currently employed by a PEARL Accredited Company (service or dealer). Additionally, applicants must satisfy all education, training, and work experience prerequisites as outlined in the PEARL Technician Profile. All applicants are required to pay in advance for the PEARL Technician Certification process to offset costs associated with application review, training, exam creation, and certification.

### Step Two – Application Review

Upon payment and submission of your application, your confirmation email will provide information on how your Primary Training Contact can verify the education/training, work experience, and employment details provided in the application. This information must be verified within 30 days of your application submission. If the application is approved, the applicant will receive an email confirmation and enrollment letter. If the application is rejected, the applicant will be notified via email and may be requested to provide additional information, if warranted. A fee of \$50.00 will be charged if the employer does not verify or approve the application within 30 days of application submission.

### Step Three – Training

The technician will be required to complete all twelve modules of the Level 2 training program. The coursework to prepare for Level 2 is geared toward refining the essential duties necessary. These courses include test equipment, insulation basics and more complicated electrical products. References are made to the PEARL standards (EERS & EEITS) so that the technician will know the proper section to match the equipment being worked on. The coursework also has an emphasis on selecting the proper test equipment.

### Step Four – Exam Scheduling

The acceptance/enrollment email will provide applicants with all the instructions needed to proceed with their exam. Exam candidates are required to present at least one valid government-issued photo identification (such as a state driver's license, ID, or passport). Only after the exam proctor has positively identified a candidate may the exam commence.

**To reschedule your exam**, you must submit a written request via email to the proctor no later than one week before your scheduled exam, requesting an alternative time. If you miss your scheduled exam time, you may reschedule your exam upon payment of an additional \$150 administrative fee. An exam may be rescheduled only twice before all exam fees are forfeited, and a new application must be submitted.

**To reschedule an exam after failing**, if you do not pass the exam on your first attempt, you may reschedule it following a 30-day waiting period. A new application and exam fee will be required if you have failed the exam more than twice.

### Step Five – Taking the Exam and Preliminary Results

After completing the required coursework, the candidate is eligible to take the exam. Exams will be administered at specific times during the year at centralized locations throughout

the US and at the annual PEARL Conference & Exhibition. Exams are administered online using a proctor. During the exam, the candidate will use their own computer, which must have a functioning microphone and camera. If an agency is used, the proctoring agency will lock down the users' browser and maintain video contact throughout the exam to ensure a secure exam environment. No reference materials, cell phone, cameras, or computers (other than the computer being used for examination and a standard calculator which is permitted for the math questions.) are allowed during the exam. Candidates are not allowed to use any notes during the exam. Candidates who violate exam rules will be disqualified from that exam. All violations of exam security will be investigated by PEARL and appropriate action will be taken. Exam time limit is 2 hours.

### Exam Grading

After participants have completed all the questions, the exam is automatically scored, tabulated, and the answers are stored in a secure PEARL/Training To Go Learning Management System (LMS). The overall exam score will determine whether you pass or fail. The minimum passing score is 70% of items answered correctly. Each time a certification exam is administered, the questions are altered, resulting in a unique exam. The passing score is established as an overall estimate of minimal acceptable competence in the Exam Content Areas, as determined by subject matter and examination experts. Passing scores are calculated based on an overall performance, not on individual Exam Subject Areas, and are independent of other candidates' scores. No partial credit will be awarded for any items answered incorrectly. Upon completion of the test, applicants are notified immediately online of their pass or fail status.

### Step Six – Official Exam Notification

Exam results are displayed on the computer screen upon completion of the exam as well as in the LMS account of the candidate. No results are provided by phone or fax. All results are confidential and are released only to the certificate candidate. The official exam notification will indicate only whether the applicant passed or failed the exam. To maintain exam security, no additional feedback will be provided to candidates regarding specific exam item answers. The candidate will be provided an on-line form to communicate any feedback about the exam.

### Step Seven – PEARL Certification

All certificates are completed after passing the exam successfully online and stored in the applicant's transcript profile on the PEARL/Training To Go Learning Management System. The Candidate can download a copy from their LMS profile.



## Training & Exam Design and Administration

### Exam Design

All training and certification exams are designed to test knowledge and skills required to perform essential duties with minimal acceptable competence. Research for these assessments was conducted under the guidance of the Employee Development Committee and PEARL staff. Each test question is crafted to measure at least one requisite area of knowledge or skill essential for task performance.

### Exam Format

All PEARL exams are administered in a test format that utilizes a variety of question types. The formats used in the exams include multiple-choice, multiple-response, matching, hotspot, and ranking. Questions may have one, two, or three correct answers. The exam does not feature essay, true/false, or yes/no questions (refer to the Sample Test Questions in this booklet for examples). These objective formats allow for broader content coverage within a given testing time and enhance the reliability of competency measurement.

### Complexity of Test Questions

At Level 2, certificate candidates should possess fundamental job knowledge and the capability to safely execute Essential Duties. The coursework to prepare for Level 2 is geared toward refining the essential duties necessary. These courses include test equipment, insulation basics and more complicated electrical products. References are made to the PEARL standards (EERS & EEITS) so that the technician will know the proper section to match the equipment being worked on. The coursework also has an emphasis on selecting the proper test equipment. More complicated quiz assessments are integrated to ready the candidate for the Level 2 exam.

### Exam Content Areas (ECAs)

Exam Content Areas (ECAs) encompass the knowledge or skills necessary for performing the essential duties specific to each Level. Every ECA contains crucial knowledge and skills needed for the essential duties of an electrical equipment reconditioning technician. However, the test designers identified certain content areas as more critical, resulting in unequal weighting across the ECAs on the exam.

### Item Appeals

Candidates wishing to appeal a specific exam item must do so after the exam period by completing the Evaluation Form. All candidate feedback will be evaluated, and necessary adjustments to the exam content will be made accordingly. However, candidates providing feedback will not receive any direct response.

### Using the Training To Go Online Training

Training To Go is the Training Partner for PEARL. It operates in a Cloud Based Learning Management System (LMS) environment. Courses have been selected to correspond with the specific levels of PEARL certification. Some of the content was prepared especially for the certification program. The candidate will have their own account on the LMS that will show the coursework assigned, certificates for each course, and ultimately the PEARL Level Certificate(s). This system also tracks the amount of time spent on each course.

The web site used is TrainingToGo.net. Email communications are sent from this website as part of the LMS. It is recommended that the candidate make sure that TrainingToGo.net is added to their safe email list.

Upon completion of the required coursework, the candidate should contact Training To Go to schedule a time to take the exam or be added to the convenient geographic location. Once registered the TrainingToGo.net site becomes the interface between the candidate and certification.

## Code of Ethics

The purpose of the Code of Ethics is to ensure industry confidence in the integrity and service of PEARL member companies while performing their duties. Additionally, it is intended to reflect the standards and behavior that PEARL certificate-holders and applicants expect of each other as they perform their work meeting strict technical, safety, and operational requirements that reaffirm the value of holding a PEARL technical certificate. PEARL-certified technicians recognize the services they render have a significant impact on the clients and industry they serve. As they perform their duties, PEARL technical certificate holders and applicants are expected to meet the following standards of professional conduct and ethics:

1. To protect themselves, their coworkers, property, and the environment by performing the Essential Duties of the PEARL-certified vocation safely and effectively, and complying with all applicable federal, state, and local regulations.
2. To represent themselves truthfully and honestly when performing their duties and throughout the entire certification process.
3. Undertake only those assignments for which they are competent by way of their education, training, and experience.
4. To adhere to all examination rules and make no attempt to complete the exam dishonestly or to assist any other person in doing so.
5. To refrain from activities that may jeopardize the integrity of the PEARL Technical Certification program.
6. Have due regard for the physical environment and for public safety, health, and well-being. If their judgment is overruled under circumstances where the safety, health, property, or welfare of the public may be endangered, they shall notify their employer, client, and such other authority as may be appropriate. An employee shall initially express those concerns to the employer.
7. Admit and accept their own errors when proven wrong and never distort nor alter the facts to justify their decisions.
8. Avoid conflicts of interest whenever possible. When unavoidable, they shall disclose to their employer or client, in writing, any action that might create the appearance of a conflict of interest.
9. Avoid receiving and granting bribery in all its forms.
10. Strive to maintain their proficiency by updating their technical knowledge and skills within the industry.
11. Not reveal facts, data, or information obtained in connection with services rendered without prior consent of the client or employer except as authorized by law.
12. Any duplication of the online training materials is strictly prohibited.

## Level 2 PEARL - Certified Technician

### Eligibility Criteria for Taking the Exam

The PEARL Level 2 Certification is designed to measure competency at an independent level. Technicians should be able to inspect, test, and perform reconditioning procedures, following PEARL and other industry standards, on a wide range of electrical power equipment, and accurately interpret equipment drawings, specifications, and electrical schematics, at the component level, as it relates to the PEARL reconditioning standards. Certificate candidates should be familiar with mechanical and electrical duties listed in the Level 2 PEARL Technician section of this handbook.

Each certification level has individual eligibility requirements, including required education and training, work history requirements, and the ability to perform specific essential duties. To receive technical certification from PEARL, a Level 2 technician must have met the following eligibility requirements:

1. Have two (2) years work experience.
2. Required training to include but not limited to either OSHA 10HR, OSHA 30HR, NFPA 70e training, etc.
3. Be currently employed by a PAC (dealer or service members). PEARL Partner members do not qualify. Candidates who do not meet this employment requirement may have this requirement waived if they have sponsorship by a PAC.
4. Passed the Level 1 exam.
5. Completed the online application.
6. Paid the training and exam fee.
7. PTC Candidate Confirmation Form completed.
8. Completed the Level 2 training.

## Continuing Professional Development Policy

Certification renews on an annual basis. Starting in 2025, renewal notices will be included in the annual membership renewal dues. A copy of the renewal notices will be emailed to the PTC for their review eight weeks prior to membership renewal. If payment is not received by PEARL within 90 days, certification will expire. Certificate renewals that are less than one year past due are subject to the renewal fee of \$75.

Payment to level up does not substitute for payment of the full renewal fee when due. Certification will be required on a lower-level certification before a higher certification can be awarded. See page 12 for eligibility requirement.

## Conditions of Application for Technicians

1. **PEARL has established policies, procedures, and fees** that govern certification decisions, the uses of certification, and interactions with applicants, certified technicians, and PTCs. These policies, procedures, and fees may be changed by PEARL at any time without prior notification. Each person who signs any PEARL application accepts and agrees to follow these policies and procedures in all dealings with PEARL.
2. **Each PEARL certification may have multiple criteria** that must be met by a candidate for the certification to be conferred. These criteria may be changed by PEARL at any time without prior notification. Individuals who do not reside in or work in the United States, Canada or a U.S. territory may not be eligible for certification. These individuals must contact PEARL before applying and may be required to follow additional procedures, with additional fees, to demonstrate they meet the criteria.
3. All applicants and certified technicians **must comply with the PEARL Code of Ethics (see page 11)** and always follow ethical practices. For example, acquiring and/or providing specific knowledge of test questions prior to testing, or acquiring or aiding during an examination; intentionally providing information to PEARL that is incomplete or inaccurate; or knowingly providing technical services in an unsafe, inaccurate, or unprofessional manner may be cause for denial, suspension, or revocation of certification.
4. PEARL reserves the right to **deny, suspend, or revoke any certification** (pending or awarded) should the association determine that an applicant or certified technician has misrepresented information, violated a PEARL policy or procedure, or violated the PEARL Code of Ethics.
5. Maintenance of **current accurate contact information** is the responsibility of the applicant. PEARL requires accurate contact information to communicate to the applicant important information related to testing, certification, and renewal.
6. **The PEARL name, logo, and certification mark** are the property of PEARL and may not be used without the expressed written permission of PEARL.

7. **PEARL approval letters, wallet cards, and certificates** are issued to certified technicians on an annual basis for their use but always remain PEARL property and may be recalled by the association at any time without prior notification.
8. **PEARL training materials, test questions, and examinations** are the property of PEARL. Any copying, sharing, or distribution of the content of the training materials, test questions and/or examinations will be cause for denial, suspension, or revocation of certification.
9. Each person who completes a PEARL application grants PEARL the **right to contact individuals** named in the application and the PTC to confirm the accuracy of information provided by the applicant.
10. **PEARL certification must be used, represented, and displayed** in accordance with PEARL policies.
11. Each person who is certified by PEARL grants PEARL the **right to provide that information** to others in response to bona fide inquiries. Test scores will be given to the test-taker only, unless the test taker submits a release form authorizing PEARL to give the scores to another specified individual.
12. **All certifications renew on an annual basis** after an individual's initial certification is awarded.

## Exam Payments and Fee Details

Payment for the PEARL Technician Certification Program is required with the application and includes the training and exam.

|   |       |
|---|-------|
| PEARL Level 2 training and exam.  | \$600 |
| Annual certification renewal. *   | \$75  |
| Certification reactivation free (if renewal is not paid within one year of due date). | \$125 |

\* If the renewal fee is not paid within 2 years, certification is no longer valid, and the technician will have to retest.

## Preparing For Your Test

This section addresses a few possible methods for preparing for the PEARL certification exam. Since the applicants and sponsoring PEARL member companies are the most familiar with the applicant's abilities, they are responsible for determining the best method for preparing for the certification exam. Following the suggestions in this section does not guarantee an applicant will pass the certification exam.

### Determining Applicant's Preparedness

An individual's preparedness for the certification test depends on a number of things, including amount of practical experience in the vocation and years of education. If you are unsure how prepared you are for the exam, you should review the Exam Content Areas for the associated PEARL Technician Certification level. If the applicant is not familiar with the required subjects for that level, he/she should consider reviewing some of the material listed in the Selected References section of this booklet.

### Using the Selected References

After reviewing the Exam Content Areas, the applicant may want to review some of the selected references. The references in this list were selected to supplement the applicant's knowledge in relevant Exam Content Areas. Experienced candidates only may have to brush-up on a few topics while those with less practical experience may have to study extensively.

### Using the Exam Content Areas as a Guide to Your Study

The Exam Content Areas are a basic outline of the exam subject matter. You can use the Exam Content Areas as your study guide by referring to them in the primary selected study references.

For example, if the applicant is unfamiliar with the PEARL Reconditioning Standard for Busway Plugs, they may review that material in ANSI/PEARL EERS (listed in the Selected References section of this booklet). Many of the selected study references can be found on the internet at no cost. Other sources not listed may be helpful in reviewing these subjects. The best preparation for the exam is practical industry experience in an electrical equipment reconditioning and repair facility. No single book is adequate to prepare individuals with the varied experiences they can gain working in an electrical equipment reconditioning and repair facility.



## Level 2 Exam Content Areas

| Exam Content Areas                                     | Skills to:   | References  |
|--|--|---|
| <b>Busway and Bus Plugs</b>                            | <ul style="list-style-type: none"> <li>• Understand the PEARL Reconditioning Standard</li> <li>• Understand the PEARL Inspection and Test Standard</li> <li>• Understand the Reconditioning sequence/process</li> <li>• Know the Busway Types</li> <li>• Identify Busway plug-in fittings</li> <li>• Understand Tap Boxes</li> <li>• Maintenance of Busway</li> <li>• Recognize tap arrangements</li> <li>• Understand feeders in an electrical distribution system</li> </ul>                             | ANSI/PEARL EERS<br><br>PEARL EEITS<br><br>Siemens Publication<br>Order No.: BUSA-SENT1-0719<br><br>Eaton Design Guide<br>DG017002EN                 |
| <b>Electrical Fittings</b>                             | <ul style="list-style-type: none"> <li>• Understand catalog codes</li> <li>• Know the different construction materials</li> <li>• Identify the different types of conduits</li> <li>• Match the fittings for the conduit types</li> <li>• Recognize the conduit body types</li> <li>• Know the various specialty fittings</li> </ul>   | Eaton-Crouse-Hinds Commercial Products Catalog<br>Emerson-Appleton-OZ Gedney Electrical Construction Catalog<br>PECO Producto Electric Corp Catalog |
| <b>Electrical Test Equipment and Insulation Theory</b> | <ul style="list-style-type: none"> <li>• Understand the purpose and properties of insulation</li> <li>• Understand what is tested in a current transformer test</li> <li>• Know insulation classes and ratings</li> <li>• Know where the test connections are located on a primary injection transformer test</li> <li>• Understand the different types of resistance tests</li> <li>• Understand ampere values and the decimal system</li> <li>• Know the features and reason for using a DLRO</li> </ul> | Megger Publication<br><br>The Complete Guide to Electrical Insulation Testing<br><br>ANSI<br><br>NETA<br><br>Manufacturer's Standards               |
| <b>Medium Voltage Fuses</b>                            | <ul style="list-style-type: none"> <li>• Know the differences between expulsion and current limiting fuses</li> <li>• Understand the fuse melting process</li> <li>• Fuse interrupting ratings</li> <li>• Know how to derate fuses</li> <li>• Know how to test for blown fuses</li> <li>• Understand the PEARL sequence for working on fuses</li> </ul>  | Edison Fuse PRACTICAL APPLICATION INFORMATION<br><br>Eaton Publication No. BR01303001E / Z11783   |

|                                   |  |   |
|-----------------------------------|--|---|
|                                   | <ul style="list-style-type: none"> <li>• Determine how and when a dummy fuse is used</li> <li>• When to apply time delay and non-time delay fuses</li> <li>• Understand and apply voltage ratings to fuses</li> <li>• Know the types of faults</li> </ul>  | Cutler Hammer Application Information CAT.20A.01.T.E  |
| <b>Low Voltage Power Breakers</b> | <ul style="list-style-type: none"> <li>• Reasons engineers select Power Breakers</li> <li>• Understand the differences of withstand, interrupting, and short time ratings</li> <li>• Have knowledge of selectivity and coordination</li> <li>• Know the reasons engineers use 100 % rated breakers</li> <li>• Understand UL, NEMA and PEARL Standards for Power Breakers</li> <li>• 3 and 4 Wire systems</li> <li>• Be aware of Ground Fault Sensing Methods</li> <li>• Know the different trip functions</li> <li>• Reasons for using Zone Selective Interlocking</li> <li>• Have the ability to read a breaker trip curve</li> <li>• Understand the replacement and retrofit options for LV Power Breakers</li> <li>• Know what Class 1 reconditioning is</li> </ul> | <p>NEMA Standard SG3</p> <p>ANSI/PEARL EERS</p> <p>UL1066</p> <p>Equipment Manufacturer Data</p>  |
| <b>Medium Voltage Control</b>     | <ul style="list-style-type: none"> <li>• Advantages of Vacuum Contactors</li> <li>• Understand the construction of MV Air Break Contactors</li> <li>• Have knowledge of NEMA E Classes of MV Control</li> <li>• Components of a Vacuum Bottle</li> <li>• Melting time of MV Fuses</li> <li>• Difference and application of Class E and R Fuses</li> <li>• Why an Isolation Switch is used</li> <li>• Know the different starting methods to control motors</li> <li>• Know rules for replacing MV fuses in MV Control applications</li> <li>• Why use MV Control</li> <li>• When to use a MV Contactor over a MV Breaker</li> <li>• When to inspect Vacuum Contactors</li> <li>• Understand control wiring diagrams</li> </ul>   | <p>ANSI</p> <p>PEARL Standards</p> <p>Manufacturer's Standards</p> <p>Rockwell Publication 1500-SG001F-EN-P</p> <p>Eaton Publication CA08100004E</p> <p>GE Limitamp Publication GET-6840C</p> |
| <b>Medium Voltage Switchgear</b>  | <ul style="list-style-type: none"> <li>• Know Potential Transformer Configurations</li> <li>• Understand IEC and ANSI Voltages</li> <li>• ARC Resistant Switchgear Functionality Ratings</li> </ul>  | <p>ANSI/PEARL EERS</p> <p>IEC</p>   |

|                                     |  |   |
|-------------------------------------|--|---|
|                                     | <ul style="list-style-type: none"> <li>• Color Code Functionality for Control Panels</li> <li>• Understand Vacuum Functionality</li> <li>• Understand differences with TOC, MOC, and Aux switches</li> <li>• Accessories available for MV Switchgear</li> </ul>  | Siemens Square D Class<br>6055Instruction Bulletin<br>6055-62   |
| <b>Molded Case Circuit Breakers</b> | <ul style="list-style-type: none"> <li>• Requires a basic understanding of UL489, UL 1066, NEMA AB3, and IEC 60947-2</li> <li>• Know trip settings</li> <li>• Be able to calculate system short circuit rating</li> <li>• Know what Series Rating is</li> <li>• Be able to recognize counterfeit breakers</li> </ul>   | ANSI/PEARL EERS<br>UL 489<br>UL1066<br>IEC60947-2<br>NEMA AB3<br>Circuit Breaker Manufacturers Standards and data |
| <b>Motor Control Centers</b>        | <ul style="list-style-type: none"> <li>• Reasons Motor Control Centers are used</li> <li>• How the power is distributed in MCCs</li> <li>• How to read a single line diagram</li> <li>• Understand PEARL Reconditioning Standard for Motor Control Centers</li> </ul>  | ANSI/PEARL EERS<br>ABB Publication GEF4629<br>Eaton Publication RP04304001E                                       |
| <b>Pilot Devices</b>                | <ul style="list-style-type: none"> <li>• Know color code for pilot devices</li> <li>• Understand single and double throw</li> <li>• Know contact block operation</li> <li>• Understand colors of flags and their meanings for circuit breaker control switches</li> <li>• Know the different types of instrument switches</li> </ul>   | Electroswitch Utility Product Catalog   |
| <b>Protective Relays</b>            | <ul style="list-style-type: none"> <li>• Understand the common ANSI Device Numbers</li> <li>• Know the sequence of operation of a 50/51 Device</li> <li>• Identify the trip characteristics of Solid-State Protective Relays</li> <li>• How to test a Solid-State Relay</li> <li>• Understand Current Transformers</li> <li>•</li> </ul>                                       | Manufacturers Data<br><br>ANSI/IEEE Standard<br><br>Applied Protective Relaying                                   |
| <b>Transformers</b>                 | <ul style="list-style-type: none"> <li>• Know how a transformer operates</li> <li>• Know VA, KVA, MVA</li> <li>• Be able to calculate KVA</li> <li>• Understand Taps</li> <li>• Understand Delta Vs. Wye Connections</li> <li>• Calculate VA, KVA, MVA</li> <li>• Slash Vs. X Voltages</li> <li>• Know Temperature Rise Classes of Liquid and Dry Type Transformers</li> </ul> | General Electric Catalog - Section 14<br><br>Eaton – Bussman Publication covering Short Circuit Calculations      |

|  |  |  |
|--|--|--|
|  | <ul style="list-style-type: none"><li>• Understand how Temperature Rise can affect the KVA Rating</li><li>• Recognize types of Compartmental Transformers</li><li>• Know fuse types available for Pad Mounted (Compartmental) Transformers</li></ul> |  |
|--|--|--|

## Sample Test Questions

The following sample test questions are provided to help candidates become familiar with the question format. The following questions reflect only a sample of the subject matter covered on the test. An answer key is given at the end of this section.

Questions will consist of multiple-choice, single answer, multiple-choice multi-answers, matching, order arrangements, and pictorial images.

Exams are delivered on-line at regional testing locations before a proctor.

1. What would you use to connect cables to the center of a run?  
A – Expansion joint  
B – Center cable tap box  
C – Wall flange  
D – End cable tap box
2. What is the fitting catalog code equal to 1-3/4 inches?  
A – 175  
B – 075  
C – 125  
D – 140

3. Match the temperature class with the rating:

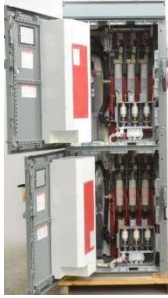
|             |                       |
|-------------|-----------------------|
| ___ Class H | 1. 130 to 155 Degrees |
| ___ Class B | 2. 155 to 180 Degrees |
| ___ Class F | 3. 180 to 200 Degrees |

4. What are the types of insulation resistance tests? (Choose 3)  
A – Short time test  
B – Dielectric absorption ratio  
C – Polarization index  
D – Ohmic test
5. If the system fault current is 7,000 amps, what fuse interrupting rating would you use?  
A – 200,000 amps  
B – 15,000 amps  
C – 10,000 amps  
D – 25,000 amps
6. Check the benefits not obtained when using an 80% rated breaker (Choose 3):  
A – Cable size savings  
B – Bus size savings  
C – All breakers on system must be derated  
D – Better system coordination

7. Select the image showing an air contactor with arc chutes:



A



B



C

8. Calculate the available short circuit current available on a system that has a 3000 KVA transformer, 480 volt secondary and 5.75% impedance:

- A – 52,296 amps
- B – 41,841 amps
- C – 22,781 amps
- D – 72,541 amps

9. Rank the sequence of operation for a 50/51 time/overcurrent induction disc relay:

- Target gets reset
- IIT switch is activated
- Pick up current starts the disc to spin
- Current increases beyond the instantaneous setting
- Target displays tripped indication

10. 1000 KVA is equivalent to:

- A – 10 MVA
- B – 1000 VA
- C – 1 MVA
- D – 10000 VA

**Answer Key:**

1. B
2. A
3. Class H = 180 to 200 degrees  
Class B = 130 to 155 degrees  
Class F = 155 to 180 degrees
4. A, B, C
5. C
6. A, B, C
7. C
8. B
9. Pick up current starts the disc to spin  
Current increases beyond the instantaneous setting  
IIT switch is activated  
Target displays tripped indication  
Target gets reset
10. C