Powell Service Division Qualification Summary
# TABLE OF CONTENTS

1. Introduction to Powell Service Division 1
2. Safety Culture 1  
   A. Safety Manual 2  
   B. Training 2  
   C. Safety Records 3  
   D. Safety Equipment 3  
   E. Safety Compliance 3  
3. Start Up and Commissioning 3  
   A. Medium Voltage Switchgear Acceptance Testing 4  
   B. Low Voltage Switchgear Acceptance Testing 4  
   C. Bus Duct Acceptance Testing 4  
   D. Relay Settings and Initial Testing 5  
4. Preventative Maintenance 5  
   A. Maintenance Programs 6  
      a. Short Term Maintenance Program 6  
      b. Long Term Maintenance Program 6  
   B. Personnel Safety 6  
      a. Remote Breaker Racking 6  
      b. On-Board Breaker Racking 6  
      c. Lock Out/Tag Out 7  
      d. Other services provided 7  
5. Turn Key Projects 7  
   A. Customized Switchgear 7  
6. Electrical Asset Preservation 8  
   A. Pre-Wired Doors 8  
   B. MV Replacement Circuit Breakers 8  
   C. Modification 9  
   D. Relay Upgrades 9  
7. Condition Monitoring 10  
   A. BriteSpot™ Thermal Monitoring 10  
8. High Resistance Grounding Unit (HRG) 10
# TABLE OF CONTENTS

9. Engineering Services
   A. Drawing Updates .................................................. 11

10. Training
    A. NFPA70E .......................................................... 11
    B. Switchgear Maintenance and Operation .................. 11
    C. Breaker Maintenance and Operation ...................... 12
    D. Medium Voltage MCC Maintenance and Operation .... 12
    E. Training Courses Contents ................................. 12

11. Emergency Services ................................................ 12

12. International Services ............................................ 12

13. Test Equipment .................................................... 13

14. Markets Served ..................................................... 13
1. INTRODUCTION TO POWELL SERVICE DIVISION

Powell Service Division, an operating division of Powell Industries, Inc., is headquartered at 7232 Airport Blvd., Houston, TX 77061. Powell was founded in 1947 by Bill Powell and has grown from a small five man operation to a large globally focused, publicly-traded company with manufacturing and sales offices in multiple countries. Powell is traded on NASDAQ under the symbol POWL. Powell’s history of forward-thinking sets the stage for our future. We continue to evolve into a larger, more comprehensive version of the service-oriented approach on which the company was founded.

As such, Powell is focused on providing excellent field service capabilities, both domestically and internationally, with trained and experienced factory certified technicians that deliver solutions on both Powell and Non-Powell Equipment. From NETA (International Electrical Testing Association) Standardized Acceptance and Maintenance Testing, to Equipment Specific, or Client-specified testing and maintenance programs, service technicians from Powell are capable and prepared. Scheduled Plant shutdowns, location specific or equipment specific maintenance scheduling, embedded maintenance technicians, turn-key operations, or emergency services, Powell is your electrical systems maintenance and testing partner.

2. SAFETY CULTURE

At Powell Safety is a Core Value. Powell believe that all injuries are preventable. When safety is a corporate value, companies strive for safety perfection. Powell strive for perfection and is committed to attaining zero incidents and we work to manage business operations to make it so: it’s the essence of a culture of sustainable safety excellence.

It is the Policy of Powell to promote safe and healthy working conditions by acknowledging safety as the highest of priorities in all of our work activities and duties. Knowledge of the job, the hazards involved, and the precautions to be taken to perform the work safely, are all critical factors in preventing accidents. It is our continued goal and commitment to eliminate occupational injuries for all our employees, Contractors and Customers. Our highest of goals with regards to Safety is to provide continual improvement of our employee’s skills and Safety Awareness through training and communication of vital safety information.

It is the expectation of Powell that every employee demonstrate the same commitment to Safety and Health that we as a Company set for ourselves. Every employee and contractor must recognize their obligation to conduct themselves in strict accordance with our Safety Policies. Every Employee and contractor must commit to immediate reporting of unsafe acts or conditions they may have knowledge of. As a dedicated team working together, we can meet our goal and commitment to bringing each of our employees and contractors home safely.
A. Safety Manual

Providing employees with a consistent set of guidelines is crucial to the success of any business consisting of work with an increased risk exposure. Our company is constantly performing gap analyses of our policies and procedures in reference to work scope of our business model. Top management plays an active role in the development and revision of our policies and procedures.

Powell has developed a Safety Manual with the following goals:

• To provide an overall guidance and direction for the safety of our employees.
• Sets principles and guidelines for making safety decisions.
• Provides a commitment to meaningful employee involvement in all aspects of the Safety Management Process.
• States top management’s commitment to Safety as a corporate value.
• Reinforces top management’s commitment to continuous improvement as a method for strengthening safety efforts.
• Provides for periodic review to ensure it continues to meet our companies safety needs.
• Has the signature of the most senior manager to demonstrate top management’s commitment to safety.
• Feedback from employees through various methods such as Safety meetings.

B. Training

Training and education are among the most important functions in our organization. Powell strives to maintain superior performance through a continuous training improvement model and continues to provide up to date and effective training and evaluation for its employees.

Powell has developed a training program with the following objectives in place:

• Training program is presented in a consistent manner and contains specific criteria related to the work performed.
• Training objectives are measurable and observable that state the desired knowledge, skill or ability to be gained by the participant.
• Safety Instructors have documented and verifiable knowledge, skills, and abilities in the subjects they teach with a demonstrated competence in instructional techniques.
• Instructors are required to maintain professional competency by participating in continuing education and professional development programs related to their subject matter and instructional skills.
• Written documentation of the evaluation methods conducted following each training session are used to verify that training has achieved the desired learning objectives.
• Assistance is given to participants of the training who do not achieve the learning objectives to ensure they understand the information presented.
• Training records are maintained in accordance with an established record keeping system and are available upon request for review by Powell customers.
• Training is updated as necessary to ensure competencies and safe work practices are maintained as required by regulatory and craft specific requirements to maintain employee safety and health.
C. **Safety Records**

Our company encourages and is in constant pursuit of acquiring and maintaining an exceptional safety record. Our philosophy is that all accidents are preventable and our goal of zero accidents and injuries in the workplace is our number one priority.

D. **Safety Equipment**

Powell is constantly researching and performing work scope risk assessments to ensure our employees are provided with the proper safety equipment. Through field safety Inspections and Quarterly Audits performed by employees and management, along with employee feedback through safety meetings, our company maintains a vigilant outlook on satisfying and exceeding the industry standard requirements for safety equipment.

E. **Safety Compliance**

Safety compliance is one of our top priorities at Powell Services Division. We maintain a current satisfactory status with many different third party Safety Consortiums (i.e. ISNET World, PICS, and PEC).

Powell’s management team performs gap assessments between our active safety policies and procedures and governing regulatory requirements as updates are released and our work scope progresses.

3. **START UP AND COMMISSIONING**

The foundation for any successfully implemented electrical system begins with a professionally planned and executed start up and commissioning program. These programs are developed to insure that the equipment, ordered by the client, meets the design criteria, installation requirements and codes, operates correctly and functions as an integrated system. Powell brings to our clients many years of successfully implemented start up and commissioning projects. Initially, Powell focused on Powell equipment, however, Powell is now regularly asked to perform these critical services on both Powell and non-Powell related equipment. Powell Field Service Technicians possess in depth hands-on experience related to a wide array of electrical equipment, and have proven this depth on a wide variety of installations in a number of different markets and industries.

Oftentimes the client will choose to contract with an independent Commissioning Agent (Cx) to manage and supervise the start up and commissioning process. Powell works with the Cx on scheduling, development of the process, executing and providing written reports to the Cx for review and verification.

From Oil Refineries, to Wind Farms, to Substations, to Data Centers and all points in-between, Powell helps the client realize cost savings by decreasing rework, minimizing change orders and reducing operating costs through efficient and thorough Start up and commissioning projects.

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*The Foundation for Any Successful Implemented Electrical System Begins with a Professionally Planned and Executed Start Up and Commissioning Program*
A. Medium Voltage Switchgear Acceptance Testing

Acceptance testing of new medium voltage switchgear is critical in proving the capacity and functionality of the new system. As the largest U.S. manufacture of MV switchgear, Powell has been on the forefront of leading robust and efficient development and design. In conjunction with this effort, Powell has been leading the charge with defined procedures for testing the new gear in its intended use environment. Whether client specific or NETA standards, Powell will meet your acceptance testing requirements.

Medium Voltage Motor Control Centers (MVMCC) are also an integrated part of the medium voltage switchgear acceptance testing offering. Powell includes these important devices in the acceptance testing schedule.

B. Low Voltage Switchgear Acceptance Testing

Like medium voltage switchgear, low voltage switchgear is critical to providing the client with the functionality and delivery of electrical power where the loads are demanded. Powell is experienced with low voltage switchgear from wide array of manufacturers including Powell, Square D, Eaton, GE, Siemens and ABB.

C. Bus Duct Acceptance Testing

Medium Voltage, Low Voltage, Segregated, Non-Segregated, Iso-phase; these bus systems provide critical path and connection points for electrical systems and as such need to be a part of the acceptance testing schedule. Powell’s Delta/Unibus division is the major designer, manufacturer and supplier of a comprehensive line of isolated phase bus, non-segregated and segregated phase bus duct, cable bus and bus accessories in the United States. Our technicians have a great deal of experience with many different installations and are very capable of satisfying the clients’ acceptance testing requirements.
D. **Relay Settings and Initial Testing**

Powell Engineering Staff includes Electrical Engineers, Mechanical Engineers and Professional Engineers (P.E.) who are often involved in developing transfer schemes, relay settings, coordination studies and hazard analysis for new equipment or system installations. The relay settings are downloaded into the protective relays during the acceptance testing phase of the project. Powell technicians are trained and experienced in setting and testing a multitude of different relays.

4. **PREVENTATIVE MAINTENANCE**

Electrical Systems require maintenance. The frequency of maintenance will be determined by a variety of factors including variables that are unique to each location. Some locations may possess environmental factors that will cause the system to require more frequent maintenance cycles. For example, a location such as a steel mill or a coal-fired power plant, where the processes being implemented create dust or other by-products, which adversely affect the reliable operation of the electrical equipment. These locations may require increased frequencies of preventative maintenance to ensure reliable operation of their electrical assets.

Other locations may be very clean environmentally but due to the critical nature of the operation(s) i.e. Data Centers, Hospitals, require increased frequencies of preventative maintenance to ensure reliable operation of their electrical assets.

Additional factors that will need to be considered are the age and condition of the electrical equipment, changes in the design or operation of the electrical system, or perhaps the management strategy related to the cost of operational inefficiencies or un-planned system outages.

In many locations, the cost of regular, on-going and planned electrical system maintenance is far less than the economic cost of just one system failure caused by non-maintained equipment. According to IEEE-493 you are much more likely to experience a failure if your maintenance program is poor. One thing that is certain is Powell's ability to provide our clients with well constructed, economical, electrical equipment maintenance programs. These programs are designed independently or collaboratively as directed by you, the client.
A. Maintenance Programs

Powell can conduct a reliability based evaluation of your electrical equipment assets taking into consideration the equipment condition, the history of maintenance, trending data, if available, and the critical nature of the application. Once this information is assessed, a dependable and logical preventative maintenance program can be configured. This plan will be presented and evaluated by both the client and Powell in order to ensure the plan meets all of the clients needs.

a. Short Term Maintenance Program

Powell will provide experienced and knowledgeable factory certified technicians that will meet the client’s pre-planned maintenance schedule and shut-down assistance. From providing project management, planning, replacement part acquisition, and scheduling to simply assisting with short term labor requirements Powell is prepared to meet its client’s maintenance requirements.

b. Long Term Maintenance Program

Powell will plan, manage, schedule, and provide the necessary trained labor to develop a 3-5 year maintenance plan. Whether conducting regularly scheduled plant maintenance activities to providing full-time embedded maintenance personnel, Powell is prepared to meet its client’s long-term maintenance requirements.

B. Personnel Safety

Powell Industries, Inc. has a corporate initiative, “Powered by Safety”. It is our goal to provide a safe working environment for all of our employees, visitors and contractors. Providing safe working conditions for our employees is one of the fundamental principles that guide our business.

This safety culture is also prominent in the products that we make. Powell was the first to introduce Arc-Resistant switchgear into the U.S. market, thus securing our position as a leader is protecting individuals that work around electrical systems. In addition, Powell has developed other products and systems like Remote Breaker Racking products, and Lock Out/Tag Out procedures that are designed to provide safe equipment operations to our clients and the individuals working around those systems.

a. Remote Breaker Racking

Powell’s family of remote racking devices allows the plant maintenance personnel to be up to twenty-five feet away from the potential arc-hazard during the movement of the breaker in its cubical. The unit travels with the circuit breaker and is easily moved to each different unit in the switchgear lineup. Powell has many different designs for many different circuit breakers.

b. On-Board Breaker Racking

PowlVac switchgear is available with an integral electric racking feature labeled “On-Board Racking”. This feature allows for the operator to select a circuit breaker to rack in or out from the connected position to the disconnected position without the attachment of a portable device. An integrally mounted racking motor is wired through the control circuit which allows a simple command to engage the racking process. This process can be controlled from any remote location by almost any method, from a simple touch screen to a fully integrated command and control network.
Upgrades can also be installed on older PowlVac equipment. Powell technicians can examine your circuit breakers and power system. After inspection, the technicians will also complete any recommended maintenance work. When completed by a qualified Powell technician this maintenance work will also provide a one year warranty as if the breaker were brand new.

c. Lock Out/Tag Out

OSHA Standard 29 CFR 1910.147/1926.417 & NFPA 70E for Lock Out/Tag Out (LOTO) procedures lays down essential performance requirements pertaining to hazardous energy and the service and maintenance of hazardous equipment. Its purpose is to protect against the consequences of unexpected “energization” or start-up of mechanical systems, or the release of stored energy—as in the case of an explosion or gas leak.

Powell HSE & Engineering departments reviews existing LOTO programs and documentation as well as developing customized bound LOTO procedures that are specific to your location. Customized programs consist of data gathering, review of one-line diagrams, evaluation and agreement between Powell and the client, and a written step by step program including digital pictures for processing and implementing the LOTO procedures. These custom programs can be easily modified and updated to reflect changes in the electrical distribution system as they occur.

d. Other services provided
- Grounding System Testing
- Battery Testing
- Thermography
- Cable Testing
- Medium Voltage Cable Termination & Splicing

5. TURN KEY PROJECTS

Each new project presents unique challenges including design constraints, scheduling, materials acquisition and control, inspections, testing, quality, shipping and transportation to name a few. Powell is often contracted to perform “turn-key solutions” whereby the client has asked us to design, install, commission and provide a fully operational asset or set of assets upon completion. Powell will work with you to determine the design, the schedule, materials, and assembly and manage any sub-contractors as needed to deliver your turn-key solution.

A. Customized Switchgear

Some turn-key projects involve being very creative to provide the client’s solution. For example, this project involved coupling new PowlVac-AR™ switchgear with an existing switchgear lineup from a different manufacturer. Powell had to contend with space constraints, access limitations, scheduling and installation restrictions, while still providing a fully operational asset upon completion. In this case Powell was able to deliver new Arc-Resistance gear with modern circuit protection, “married” to the existing gear. Subsequent projects would include updating the one-line diagrams, and providing arc flash hazard analysis.
6. ELECTRICAL ASSET PRESERVATION

Competitive economic environments require operating personnel to ensure the assets being used are maintained and operational at their highest levels. Sometimes the equipment is being used well beyond its normal life expectancy. When a client has implemented and executed a well defined maintenance program, the asset manager may well be able to extend the operational life of certain electrical devices. When all factors are considered (cost, life cycle, number of operations, maintenance trends, etc) the best solution may be to defer capital expenditures and invest in other options that will provide an extended capability for the electrical asset. Powell has developed a number of reliable options providing the client with dependable and affordable asset preservation options. Included among these are: Pre-wired replacement doors, with Replacement breakers, Retro-fill breakers, Relay upgrades and High Resistant Ground Units (HRG).

A. Pre-Wired Doors

Powell technicians will obtain measurements on existing cubicle doors. These measurements are provided to our Engineering department along with existing control and protection schemes. The Engineering department designs complete door replacement solutions that include upgraded protective relay and plug & play control schemes. Manufacturing then produces the doors after which the assemblers mount all of the new equipment and wiring connections. The final product is a door that easily mounts onto your existing equipment with wiring connection points readily identified and accessible. Powell technicians would finalize the process by removing the old doors and re-installing the new.

B. MV Replacement Circuit Breakers

Powell is a leading supplier of after-market low and medium voltage direct roll-in replacement breakers. These breakers are interchangeable and leave the factory ready to be inserted into existing switchgear, thus providing the client reduced downtime and a cost efficient option when compared to new equipment. Powell incorporates proven technology such as vacuum interrupters into its medium voltage designs, such as vacuum interrupters and heavy duty mechanical components. These breakers are designed and tested to IEEE/ANSI standards and improve system reliability and provide technology upgrades.

Powell’s medium voltage replacement breakers can provide greater interrupting capabilities and preserve the original breaker dimensions. Average maintenance time is reduced because there are no fragile arc chute assemblies to manage and inspection time is greatly reduced with the new mechanism.

Operator safety is improved as the new vacuum interrupters eliminate old arc chutes which contain asbestos, and the clearing time is shorter. Powell offers a wide array of pre-engineered, quick turn-around breakers for most major manufacturers. Fewer inventories of old replacement parts, reduced maintenance costs, increased operator safety, increased fault capability, improved system reliability, and more reliable technology, make Powell medium voltage replacement breakers a solid choice when upgrading and preserving existing electrical assets.

Pre-wired Doors with Upgraded Control and Protection Components

PowlVac® AM Type Medium Voltage Replacement Breaker
C. **Modification**

Powell retro-fill option provides many of the benefits of a direct roll-in medium voltage replacement breaker. Reduced maintenance costs, increased operator safety, improved system reliability, newer vacuum interrupter technologies in a cost effect solution.

Powell engineering and field technicians will work with the end-user to obtain accurate dimensions and operational notes required to retro-fill the existing breaker cubicle. After the breaker is manufactured and tested to ANSI C37 standards, Powell field technicians will make the necessary modifications to the existing breaker cubicle and insert the new breaker.

These breakers can be incorporated into almost any existing switchgear when a suitable replacement breaker is not available. Powell retro-fill breakers are production tested and will provide many years of extended life to the electrical asset being modified. Modern technology, closed door draw out racking, MOC and TOC contact integral to the cell, front accessible mechanism, and years of reliable operation, make Powell’s retro-fill breakers a solid economic value.

D. **Relay Upgrades**

Microprocessor-based distribution relays provide significant features that improve distribution protection and provide a higher level of event analysis and testing. Many of these improvements are designed to handle system disturbances, relay failures, changing system conditions and changes in protection configuration. Upgrading older electro-mechanical relays provides multiple advantages. Powell factory certified technicians, working jointly with Powell engineering, deliver a turn-key approach to replacing the older relays in order to take advantage of these advantages.

One such advantage is Arc-flash mitigation delivered in the form of a microprocessor-based relay, reducing arc-flash incident energy with fast detection and tripping, utilized light sensing technology, fiber optics.

Another advantage is the ability provided by microprocessor-based relays to capture event histories and precise fault current magnitude within the protective relay. Powell is experienced in configuring, testing, and installing relays from various manufacturers allowing the client to take advantage of the latest technologies.

![Before and After Installation of a New PowIVac-ND® Retro-fill of Cell and Installation Replacement Breaker](image1)

![Powell Installations of Feeder Protection Relay Incorporating Fiber Optic Sensing Technology](image2)
7. CONDITION MONITORING

According to the U.S. Department of Energy, in its 2006 International Energy Report, total worldwide energy consumption from 1980 to 2006 increased 66%. According to the North American Electrical Reliability Corp. (NERC), peak demand from 2007 to 2017 will increase from 783GW to 935GW, a 19% increase in North America alone. With ever increasing energy demands more diligent requirements for maintaining and monitoring electrical equipment are required. Powell provides installation of its BriteSpot™ Thermal Monitoring, Partial Discharge Testing, and Annual Thermographic scanning as three methods for providing condition assessment on electrical equipment resources.

A. BriteSpot™ Thermal Monitoring

BriteSpot provides immediate, accurate, and continuous 24/7 fiber-optic temperature measurement. Because electrical currents generate heat, temperature monitoring has become an efficient way to predict potential equipment failure. BriteSpot provides the best solution for accurate and consistent recording of electrical temperatures at areas of concern. The basic principal behind the operation of BriteSpot is light transmitted and received over polymer fibers modified by temperatures. The properties of the light are modified by the sensor as the temperature changes, allowing for accurate determination of temperature. By using light, the fibers do not require any electrically conductive elements, allowing them to be used safely in medium to low voltage energized equipment. The fiber can be routed around live components without degrading the dielectric integrity of the equipment. Real time data and the ability to monitor locations inaccessible to traditional thermographic scanning, provide significant advantages.

8. HIGH RESISTANCE GROUNDING UNIT (HRG)

As part of the asset preservation concept, Powell’s High Resistance Ground-Gard, is a complete assembly for high resistance neutral grounding which features an alarm system and utilizes a pulsing current to locate the first ground fault.

Facilities with ungrounded electric power systems can experience equipment damage, caused by excessive voltage transients and elevated maintenance costs associated with these ground faults. Powell HRG are designed to alleviate this system characteristic.

HRG are packaged in many kinds of enclosures. A typical free-standing enclosure is shown on next page. An alternate design for low voltage equipment consists of a wall-mounted control enclosure and a separate resistor enclosure which can be mounted on top of the control cabinet or in a separate location. Ground-Gard® equipment can be furnished as part of a substation or other larger switchgear equipment and incorporated into the manufactured design.

Powell HRG Advantages:
• No tripping of feeder breakers on occurrence of first ground fault
• Minimum flash hazard to personnel during ground fault
• Minimum arcing fault damage to equipment during ground fault regardless of fault location
• Practical suppression of transient over-voltage due to arcing ground fault
• Practical reduction of equipment damage due to high impedance faults
9. ENGINEERING SERVICES

Powell’s engineering staff include Electrical Engineers, Mechanical Engineers and Professional Engineers (P.E.) that offer the engineering services required to periodically evaluate, review and design changes to electrical distribution systems. Powell’s engineering staff uses state-of-the-art hardware and software to analyze the need of power systems and provide critical information used to make informed decisions.

A. Drawing Updates

The single-line diagram is the most important drawing a plant can have for understanding its electrical system. A one-line diagram is a drawing in which a single line represents three phases of a 3-phase power system. If properly drawn, it shows a correct power distribution path from the incoming power source to each downstream load — including the ratings and sizes of each piece of electrical equipment, their circuit conductors, and their protective devices.

Oftentimes one-line diagrams are neglected and not update when changes to the electrical system occur. Powell technicians and engineering work closely with plant personnel to update and provide current revisions of the modified one line diagrams. It’s important to keep your one-line diagram and associated electrical documentation accurate.

A one-line diagram of a plant’s electrical distribution system should include:

- Transformer ratings, voltage ratio, impedance, and winding connections
- Feeder cable phase, neutral, and ground sizes; length of cable, conductor material, and conduit size and type
- Switchgear, switchboards, panel boards, MCCs, fuses, circuit breakers, automatic transfer switches, and continuous current ratings
- Protective relays with appropriate device numbers, and CTs with associated ratios
- Detailed legend indicating device types, identification, and other significant details

10. TRAINING

Powell training classes offer the student a comprehensive approach to understanding the subject matter that is being offered, by providing instructors that are “field” experienced, and have the talent of communicating this experience in the classroom environment. The instructors are skilled in developing group discussions that foster interactions within the classroom, leading to a broader understanding of the material being covered.

A. NFPA70E

Company specific written electrical safety program considerations begin the discussions. NFPA70E safety training is emphasized. NFPA70E example forms for Job Briefing, Energized Electrical Work Permit, Logout/Tagout Procedures, etc. are reviewed. Instructional safety videos illustrate NFPA70E examples of workplace violations. Confirming an electrically safe work condition for switchgear and MCC’s are discussed; Lockout/Tagout procedures are emphasized. Matrices for Hazard/risks category classifications, protective clothing and PPE and their characteristics are reviewed. An example of an Arc Flash Label is used to discuss PPE requirements, flash hazard, limited approach, restricted approach, and prohibited approach boundaries. NFPA70E general requirements for electrical installations are mentioned and a copy of NFPA70E, “Standards for Electrical Safety in the Workplace” is included for discussion and reference.

B. Switchgear Maintenance and Operation

ANSI medium voltage switchgear circuit breaker ratings are reviewed and explained, including one-line diagrams, three-line diagrams, and control drawings. Medium voltage circuit breaker design and construction are presented as well as control schemes including close, trip, lockout and anti-pump logic. NFPA70E Logout/Tagout and safety practices are reviewed, as well as general testing and maintenance practices. “Hands-on” sessions reinforce classroom discussions. Instruction manual(s) and project specific equipment drawing may also be included.
C. **Breaker Maintenance and Operation**

Medium voltage breaker design and construction is reviewed and explained. Emphasis on troubleshooting circuit breaker components, operation, and internal control schemes, including close coil, trip coil, optional secondary trip coil, optional under voltage trip device and anti-pump logic. NFPA70E LogOut/TagOut practices are reviewed and discussed. General testing and maintenance procedures including “hand-on” sessions are included. Class documents include manufacturer instruction manual(s) and project specific drawings if applicable.

D. **Medium Voltage MCC Maintenance and Operation**

Equipment construction, arrangement, ratings, modular component options and capabilities are reviewed. Typical arrangements and grounding methods are discussed, including circuit breaker and fuse considerations, component and system integration. Typical induction motor schematic diagrams are discussed; control methods include FVNR with start-stop and H-O-A control, under voltage dropout with delay, reduced voltage starting methods, and reacceleration group motor restarting after voltage depression. Testing and maintenance methods are presented. Safety is emphasized throughout the class. Equipment exhibits reinforce discussion topics, with “hand-on” sessions performing basic mechanical handling, contractor “racking-in and racking-out”, functional and electrical tests are reviewed.

E. **Training Courses Contents**

- EL101 Electrical Equipment Basics
- SAFE102 Electrical Safety and Arc Flash Awareness
- PV102 Low Voltage Switchgear Basics for Operators and Electricians
- PV202 5-15kV PowlVac Switchgear for Operators and Electricians
- PV302 27-38kV PowlVac Switchgear for Operators and Electricians
- PVCB102 PowlVac Circuit Breaker Testing Maintenance and Troubleshooting
- MCC102 LV Motor Control Center Basics for Operators and Electricians
- MCC202 MV Motor Control Center Basics for Operators and Electricians
- HRG102 Resistance Grounding Fundamentals
- RELAY101 Protection Relay Basics

11. **EMERGENCY SERVICES**

Powell answers the phone 24 hours a day 365 days a year. If an emergency failure occurs in the field, Powell will answer your call and respond. From providing parts to full emergency project management and resolution, Powell responds with field experienced technicians, engineering services and quick turn-around manufacturing. Our goal is to have the client back up and operational in a safe and expedient manner.

12. **INTERNATIONAL SERVICES**

Originally started as a custom fabrication shop in Houston, Texas, Powell now provides equipment and services around the globe. From Ecuador to Kuwait, from Singapore to Nigeria and all points in between, Powell has dedicated international factory certified technicians that are Powell employees, and are experienced with the nuances and challenges involved with international travel and work. Our dedicated international field service team completes projects that are durations from one-two months and one-two years and beyond. Consisting of P.E.’s and very experienced technicians the international field service team can deliver.
13. TEST EQUIPMENT

Powell owns and maintains the best known, most reliable, test equipment available in the market today. Each piece of test equipment is tested and re-calibrated annually with each certificate maintained by our operations manager. Powell also provides each factory certified technicians with their own PPE, personal protective equipment, including grounding equipment, insulated hot sticks and insulated tools required for safe work. Field technicians are required to inspect their equipment as part of our safety program and turn in any defective items for repair or replacement.

14. MARKETS SERVED

Powell has a broad range of experience on many different types and manufacturers of electrical distribution equipment. Powell serves key clients around the world in these markets:

- Oil and Gas Refining
- Offshore Oil and Gas Production
- Petrochemical
- Pipelines
- Terminals
- Pulp and Paper
- Mining and Metals
- Light Rail Traction Power
- Electric Utilities
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