Qualified Worker Series
Electrical Workers
Syllabus

Syllabus Introduction

The purpose of this ***Qualified Worker Series*** *is to provide Guidance to Good Practices for Training and Qualification of Maintenance Personnel*. Our purpose is to provide information that can be used to verify the adequacy of and/or modify existing maintenance training programs, or to develop new training programs. Training should reflect applicable standards and technical expertise to apply standards. Employers should not feel obligated to adopt all parts of this guide. Rather, they can use the information contained in this guide to develop programs that are applicable to their facility. Qualified Persons must be trained in respect to job task they will be performing. Employers are admonished by OSHA to make sure training is germane to work being performed. For example those working in highly concentrated chemical environments will have hazards to control that those not working in chemical environments will encounter.

This Syllabus, used in conjunction with facility-specific job analyses, provides a framework for training and qualification programs for maintenance personnel. Recommendations for qualification are made in areas of education and experience. The functional positions of maintenance mechanic, electrician, and instrumentation technician are considered by this syllabus. Sufficient common knowledge and skills should be obtained with OJT.

Why Have The Qualified Worker Series?

Awareness… NFPA and OSHA requirements mandate that workers be qualified. Workers should never be subjected to tasks for which they are not familiar. These tasks may contain hazards the worker is unaware of.

What Does The Qualified Worker Do For Me?

Protects the worker … The qualified worker series helps the employer meet training requirements mandated by OSHA and NFPA standards. This series assures both employee and the employer that proper attention and training have been given to the employee concerning potential electrical shock, fire and arc flash hazards. See "Qualified Worker" Ebook at www.integforce.com for details of requirements.

What Is The Qualified Worker Series Program?

The purpose of this program is to help workers avoid shock, fire and arc flash hazards and to meet the requirements (based on definitions and interpretations given in the NFPA and OSHA standards) of a qualified person.

A qualified person is defined as one who has skills and knowledge related to the construction and operation of electrical equipment installation and has training on the hazards involved in NFPA 70 E A and on articles 100, 110.6(D), OSHA 1910. Subpart S.

Qualified individuals should be familiar with the proper use of special precautionary techniques, personal protective equipment, arc flash, insulating and shielding materials, insulated tools and test equipment. A person can be considered qualified with respect to certain equipment methods, but still be unqualified for others.

A qualified person can be an employee who is undergoing on-the-job training (under a Qualified Person) and who, in the course of such training, has demonstrated the ability to perform duties safely at his or her level of training. The duties under the direction and supervision of a qualified person shall be considered to be a qualified person for performance of those duties.

A qualified person is permitted into a limited approach boundary of exposed live parts operating in 50 Volts or more, and shall, at the minimum, be additionally trained in all of the following:

1. The skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment

2. The skills and techniques necessary to determine a nominal voltage of exposed live parts

3. The approach distance as specified in table 130.2 (C) and the corresponding voltages to which the qualified person would be exposed

4. The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment (PPE) and job planning necessary to perform the task safely

Unqualified persons shall be trained in and be familiar with any of the electrical safety related practices that might not be addressed specifically by OSHA 1910.SubpartS and chapter 1 of NFPA 70 E but are germane to the workers work task.
Just by the nature of their job, some workers have association with electricity.

Examples of workers who are considered unqualified electrical workers, but must have training associated with their electrical job task are as follows:

1. Operators
2. Welders
3. Machinist
4. Mill Rights
5. Pipefitters
6. Boilermakers
7. Mechanical Engineers
8. Chemical Engineers
9. Industrial Engineers
10. Laborers

What Are The Training Requirements For A Qualified Worker?

See OSHA 1910 Subpart S & NFPA 70 E 110 f

NOTE : OSHA has given an interpretation (09/09/1993, Roger A. Clark, Director, Directorate of Compliance Programs) states training must be congruent with OSHA 1910. Subpart S. 330-308 & 331-335.

Qualified Worker Series

The series is written primarily for those involved directly with electrical installations, construction and maintenance of electrical equipment and conductors. Exposure to these courses alerts the worker to typical potential electrical hazards. It also trains the worker to recognize potential electrical hazards.

OSHA 1910.Subpart S and the qualified workers series is based on the following standards

1. NFPA 70 – *National Code Electrical*
2. NFPA 70 E – *Electrical Safety In The Workplace*
3. NFPA 70 B- *Preventive and Predictive Maintenance Standard*
4. NFPA 79 – *Industrial Machines*
5. IEEE Green book - *Grounding , Bonding and Shielding of Power Systems*
6. IEEE Emerald book - *Grounding , Bonding and Shielding of Sensitive Electronic Equipment*
7. IEEE 1584
8. OSHA 1910 Subpart S, below 600 Volts
9. OSHA 1910.269, above 600 Volts
10. Basic Electrical Theory As Applied To Codes and Standards

What Happens When All Courses Are Completed?

When all courses have been completed a proctored exam is given, which covers all eight courses. Once the exam has been successfully passed the participant is given a "qualified worker series" certificate.

What Does This Series Cover?

The following is a list of courses designed for the qualified worker series certificate.

1. Understanding Basic Electricity For Electrical Safety

Part 1 - This course prepares the student to understand basic theorems as applied to codes and standards. Participants will be trained in the four secrets of electricity and how three phase and a single phase systems operate. This course covers AC/DC theory as applied in real world situations to codes and standards. This course provides the basic understanding of circuitry, motors, and transformers theory as applied to codes and standards applications is also given.

Part 2 - This course prepares the student from a practical standpoint to understand how power laws, overcurrent protection, and wiring methods apply to codes and standards. This course will give the participant a greater understanding of how theory is applied to codes and standards. The participant will learn the theoretical intent and purpose of code making bodies and how codes and standards are applied in real world situations.

2. OSHA Electrical Requirements - CFR 1910 Subpart S., less than 600 Volts

The participant will be exposed to the basic tenets of the OSHA electrical requirements. A checklist will be given, similar to those used by OSHA compliance officers. Details of how to recognize and handle below 600 V electrical hazards are explained and applied to real world applications. Case studies with proven applications to electrical hazards are explained. Details include OSHA requirements for wiring methods, grounding, overcurrent protection, identification requirements and hazardous locations.

3. Guide To Electrical Safety Work Practices NFPA 70 E

This course covers safe maintenance practices, safe installations, and safe working conditions. The worker is trained in all the principles of electrical safety. Also covered in this course are arc-flash, proper procedures, PPE, approached distances, shock boundaries, and responsibilities of the electrical worker. This course will make the worker, aware of potential electrical safety hazards and how they should be handled. What and how to use PPE, tools and company procedures. Adherence to company protocol and a productive safety culture is emphasized. Participant will also learn how to properly energize and deenergize electrical equipment and know its related uses, such as pneumatic and mechanical applications. This participant will learn the worker's value as a part of the electrical task force or on site AHJ.

4. Guide To The National Electrical Code For Field Use NFPA 70

This course trains the participant how to look up issues in the National Electrical Code quickly. After successful completion of the course, participant will be able to determine working space, dedicated space and access issues. Specific rules and definitions are explained concerning how to properly apply services, feeders and branch circuits to real world applications. Basic identification requirements of grounding, panel board, switchgear, motor, motor control, transformers and circuitry are explored in this course. Proper connections and terminations along with hazardous locations and specialty applications are also covered in this course. Knowledge of the basic principles of overcurrent protection, grounding, bonding, and shielding and is given. Participants should fully know how to use the National Electrical Code for any application as applied to electrical hazards and operation when finished with this course.

5. Grounding Bonding and Shielding

This course covers the basic principles of grounding, bonding, shielding and their use in protecting the electrical worker and others associated with the operation, installation, and construction of equipment. This course covers details of grounding, bonding, and shielding requirements for application sizing and protection. It defines the different types of grounding and how it is applied to real world applications. It deals with objective currents and how to handle them in relation to sensitive electronic equipment.

6. Preventive and Predictive Maintenance Standard - NFPA 70 B

Recommended Practice For Equipment Maintenance

This course provides the qualified electrical worker with information to properly use maintenance techniques and requirements that avoid potential electrical hazards. It specifically provides techniques to prevent shock and fire hazards associated with the electrical equipment maintenance. Participants will have a greater knowledge of how to prevent hazards such as burn and shock. It also teaches participants to recognize potential electrical hazards. This course covers maintenance requirements for substations, control systems, power, cable and premise wiring systems. It provides proven test methods and troubleshooting techniques. The objectives of this course will enable the participant to understand how proper predictive and preventive maintenance techniques can provide greater production and safety to the worker and company.

7. Industrial Machines NFPA 79

This course has proven to be a valuable tool for those who work with industrial machines and control panels. It answers several questions for maintenance and construction personnel. Issues such as identification and control panel requirements for conductors, overcurrent protection, grounding, bonding, shielding, disconnects, interlocks and differential system voltages are covered in this course. Each course relates to an electrical safety hazard applied to warn the electrical worker that a potential electrical hazard exists. This course makes the worker aware of deficiencies that should be corrected immediately.

8. OSHA Electrical Requirements – CFR 1910.269 above 600 Volts

In this course, the participant is given detailed information on how to handle above 600 Volts of electrical hazards. It includes theory, grounding, overcurrent protection, particular wiring methods and PPE to protect the worker. This course also covers particular case studies and wiring methods that have proven to protect electrical workers. It also reveals and helps the worker to recognize potential electrical hazards.

Syllabus Detail Topics

The Qualified Worker Series is based on the following applicable codes and standards: OSHA CFR 1910.269; OSHA 1910.Subpart S, NFPA 70, NFPA 70 B, NFPA 70 E, NFPA 79, NFPA 77, NFPA 780, IEEE1584, IEEE Green Book, IEEE Emerald Book, IEEE Gray Book, IEEE Red Book, NEMA MG-1and related theory as applied to electrical safety and standards.

The intent of this course is to present the student with information and direction as related to Qualified Electrical Worker needs in real world application.

Topics Include:

- Understand The Four Secrets of Electricity
- Basic Circuitry
- Series and Parallel Circuits
- Three-Phase Power Theory
- Practical Power Law Calculations
- Describe the use of Delta and Wye Connections
- Describe the Operation of a 3-phase Motor
- Identify the Major Parts of Control Diagrams
- How To Read Control Diagrams
- Understanding Basic Plant or Building Circuitry
- How to Connect and Disconnect an Electric Motor
- Sizing Transformers
- Proper Application of Fuses and Breakers
- Working Clearance and Dedicated Space
- Live Parts – Protection Requirements
- Arc Flash Requirements
- Arc Flash Boundary Requirements
- Qualified / Unqualified Person
- De-energizing Circuit Requirements
- Energizing Circuit Requirements
- Purpose of Overcurrent Protection
- Circuit Breakers and Fuse Application
- Overcurrent / Overload
- Identification of Disconnection Means Requirements
- Examination, Installation, and use of Electrical Equipment
- Identification Requirements for Branch, Service, and Feeder Circuits
- Identification Requirements for Motor Controls
- Use and Identification of Grounded and Grounding Conductors
- How Improper Identification Causes Electrical Accidents
- Basics of Preventing Electrical Accidents with Electrical Circuitry
- Overcurrent Protection for Shock and Fire Protection
- How Overcurrent Protection Applies to Proper PPE for Arc Flash Protection

- How Overcurrent Protection Applies to Arc Flash Boundaries
- How to Prevent Electrical Explosion
- Approach Distance
- Safety-related maintenance requirements
- Safety requirements for special equipment
- How To Test For Insulation Integrity
- Safe Installation
- Safe Maintenance Standards
- Safe Maintenance of Electrical Equipment
- Which Employees Must Be Trained
- Safe Electrical Work Practice
- Electrically Safe Work Place
- Proper Lock/Tag Out Requirements
- Proper Energizing Techniques
- Proper De-energizing Techniques
- Working On Energized (Live) Parts
- Test Equipment and Insulated Tools
- Proper Personal Protective Equipment
- Maintenance Test and Inspection Procedures
- How To Test cable
- How To Make a Visual Inspection of Conductors and Equipment
- Identification Requirements
- Splices
- Terminations
- Connections
- Wiring Methods
    1. Ampacity of Conductors Feeders and Branch Circuits
    2. Venting and Cooling Of Equipment
    3. Guarding of live parts
    4. Protection From Physical Damage
    5. Warning Sign Requirements
    6. Box Sizing and Application
    7. Raceway Sizing and Applications
    8. Cable Applications
    9. Cable Tray Requirements
    10. Cable Locations
    11. Temporary Wiring Methods
    12. Cabinets

- Motor Applications
- Understanding Motor Control
- How To Use Nameplate Information, Motors, Panels, Transformers and Machines
- Color Code Requirements
- Max Wire Size for Starter Sizes
- Control Transformer

- Overcurrent Protection Requirements for Motors, Transformers, Industrial Machines and Equipment
- Sizing Motor Feeder and Branch Circuits Conductors
- Purpose Of Grounding, Bonding and Shielding
- Size of Equipment Ground Conductor
- Sizing Grounding Electrode Conductor
- Removing the Myths of Grounding, Bonding and Shielding
- Definition Of Terms
- Grounding Electrode System
- Equipment Grounding
- Purpose and Application of Bonding
- How To Properly Shield
- Understanding Power Quality Issues
- How Power Quality Issues Destroy Equipment
- Hazardous Locations Class I, II & III
    1. Wiring Methods
    2. Motors
    3. Control Equipment
    4. Transformers
    5. Capacitors
    6. Generators
    7. Switchgear

1. SCOPE

1.1 Purpose

This syllabus provides recommended education, experience, and training for maintenance personnel. Training and qualification programs based on the content of this syllabus should provide assurance that maintenance personnel perform their jobs safely and competently.

1.2 Background

Industrial plant management and contractor representatives identified the need for maintenance personnel training and qualification guidance. This need was based on the increasing emphasis on properly conducting maintenance activities in the industry. Maintenance has become a focal point because of its impact on facility operation and safety. Medical, production insurance cost and OSHA requirements are all factors that developed this program.

This program was based on a detailed review of maintenance mechanic, electrician, and instrumentation technician Job/Task Analysis (JTA) data. Sufficient common knowledge and skills were found to include the three disciplines in one guidance document.

This program to good practices was developed based on the results of the commercial utility industry-wide JTA, industry operating experience, and general industry Occupational Safety and Health Administration (OSHA) training requirements.

1.3 Application

The content of this syllabus is generally applicable to all facilities with the exception of those topics which are related specifically for out the norm applications. Portions of the programs outlined may not be applicable to all facilities because maintenance department organizations, disciplines, titles, and responsibilities vary among facilities. Facility training personnel can verify the adequacy or

improve existing training programs by adapting this guide to their specific facility and individual maintenance disciplines. Our goal has been to meet the basic tenets of the OSHA requirements and related documents to provide a safe and productive work environment.

1.3.1 Discussion

Each facility should use a systematic approach to analyze its training needs to develop a facility-specific training program. Analysis results should be used to establish training program learning objectives, test items, instructional methods, and instructional settings. Performance measures used to evaluate employees' performance and assess training effectiveness can also be derived from the analysis.

Full implementation of quality training requires a long-term commitment. Training activities should be carefully managed to produce effective results. Training programs should be evaluated on a regular basis to determine the extent to which established learning objectives are being accomplished. Evaluation results should be used to improve training plans, facilities, programs, materials, and procedures. In addition, a systematic method to update training program content as a result of facility modifications, operating experiences, procedure changes, and changes in job requirements should be implemented.

NOTE: Qualified Worker Training should be updated every three years and based on changes within applicable standards. Note: Certificate Qualified Workers will be required to take one updated course every three years to keep certificate renewed.

2. GOALS

2.1 Initial Qualifications

The goal of initial training and qualification is to ensure that maintenance personnel, including maintenance trainers, possess the knowledge and skills necessary to perform their assigned responsibilities in an efficient, cost-effective and safe manner that promotes safe and reliable facility operations.

2.2 Continuing Training

Continuing training programs are designed and implemented to maintain and enhance the proficiency of maintenance personnel. The goal of this program (Qualified Worker Series) is to provide assurance that maintenance personnel knowledge and skills are maintained with regard to changes in facility physical and procedural modifications, changes to regulatory requirements, and lessons learned from industry and facility-specific operating experience. Improvement in job performance and development of broader scope and depth of job-related knowledge and skills are also goals of a continuing training program.

Maintenance trainers should continue their professional development both in subject matter and instructional skills by such activities as attending conferences, taking additional college and/or specialized skill courses, and exchanging training ideas with other training organizations.

3. QUALIFICATIONS

3.1 Qualification Levels

This syllabus does not attempt to establish a minimum or maximum number of qualification levels. However, it is recommended that more than one level within each discipline be established to allow early entry of trained personnel into the maintenance workforce and to provide a career path (e.g., apprentice, journeyman, master). Qualification levels should be defined and included in job descriptions, and the training needs for each level should be identified during the design of individual training programs.

3.1.1 Maintenance Disciplines

This syllabus should be taken as indicative of the training necessary to achieve the highest qualification level in each discipline. Each individual may not need to qualify for every task. All training should include, as a minimum, those fundamentals applicable to the tasks on which the individual is being qualified.

Fundamentals will ordinarily be defined by a job analysis. The trainee should demonstrate mastery of the tasks or type of tasks assigned under the direction of a person qualified to perform the task prior to assuming independent responsibility. Incumbents should be qualified at their present level before advancing to the next level.

3.1.2 Maintenance Trainers

Minimum qualifications for all maintenance training positions should be documented for the following areas:

- Education
- Training experience
- Applicable job experience

Documentation should clearly state who verifies that instructors meet the minimum qualifications for the positions they hold. Additional guidance relative to qualification of training personnel may be found in *DOE-STD-1001-96 Guide to Good Practices for Training and Qualification of Instructors.*

3.2 Education

Educational requirements should be consistent with those in regulatory documents. A high school education or General Education Development (GED) equivalent is recommended for entry into maintenance training programs.

3.3 Physical Attributes

The following physical attributes are recommended for safe performance of assigned tasks:

- Natural or corrected near-distance visual acuity
- Color vision sufficient to discern system and component color coding
- Hearing sufficient to respond properly to audible alarms and use communications systems, sufficient strength, motor power, range of motion, and dexterity to allow access to facility equipment and meet job performance requirements.

3.4 Training

The trainee should complete the training described in this syllabus and remain updated as mandated by OSHA and related NFPA standards.

3.5 Subcontractor Personnel

Training for subcontracted-services personnel should be consistent with the duties being assigned. These personnel should be qualified on the task they will be performing.

4. ON-THE-JOB TRAINING (OJT)

OJT is designed to prepare employees for job performance through one-on-one training and performance testing that is conducted by qualified OJT instructors in the actual work environment. It provides hands-on experience, and has the advantage of providing training for tasks that are of immediate need to the employee. OJT is limited to those situations where it is administratively and physically possible to conduct the training (i.e., where facilities are adequate, where OJT can be conducted without significant interference with facility operations and where qualified personnel are available to conduct and manage the OJT program). OJT is not a substitute for class room training.

All on-the-job training programs should be based on a systematic approach to training. For further guidance on developing, implementing, and evaluating an OJT program, refer to *DOE-STD-1012-92 Guide to Good Practices for On-the-Job Training.*

5. TRAINEE EVALUATION

5.1 Introduction

The quality of training programs, course content, and instructional methods is best evaluated by monitoring trainee performance. This guide outlines training that occurs in multiple training settings. Different methods of evaluating trainee performance during these training programs are appropriate. Among these methods are written examinations and quizzes, oral examinations, and performance tests. It is important that evaluation methods are consistent with the training setting. General guidelines for using these evaluation methods are given below. When an employee completes ***Qualified Worker Series*** training a proctored exam is administered. Upon successfully passing the final exam the employee will be issued a certificate.

5.2 Knowledge Evaluation

In knowledge areas such as administrative, academic, and systems training, the recommended method of trainee evaluation is the use of written short-answer, multiple-choice, or essay examinations at the conclusion of each course. Oral examinations may also be used to determine knowledge level. Periodic written quizzes can measure trainee retention during training courses. The examination should address all

subjects within that course and be designed to measure retention, understanding, and the ability of the trainee to apply theoretical knowledge. To test the trainees' ability to apply theoretical knowledge, the examination may include a number of essay questions. Performance on written examinations should be measured against established learning objectives and an answer key.

When an employee completes ***Qualified Worker Series*** training a proctored exam is administered. Upon successfully passing the final exam the employee will be issued a certificate. Updated training should occur every three years.

5.3 Performance Tests

Performance tests should be structured to measure trainees' performance against established criteria.
Areas that should be covered include:

- Technical and facility administrative procedure
- Usage Tool and equipment selection
- Equipment operation
- Industrial safety practices
- Facility safety and reliability awareness
- Task performance.

The evaluation of each trainee should be conducted as the trainee either performs or simulates and discusses the complete task. The perform option is preferred whenever practical. Evaluation should be performed by the AHJ such as supervision, safety manager etc.. Established standards, policy and procedures should be used to ensure consistency in evaluating performance tests. When the employees have completed fundamental training, they may be considered ready for individual task qualification.

6. CONTINUING TRAINING

6.1 Introduction

Continuing training needs should be identified from job analysis information and the results of ongoing training program evaluation. Evaluation ensures that the training program is current and relevant and that job performance does not degrade.

6.2 Facility-Specific Systems Training

Facility-specific systems training provides an understanding of overall facility operations. Since much of this subject matter is not reinforced by direct use, an annual training schedule is recommended. As a minimum, safety-related systems identified in the facility Safety Analysis Report should be included. Lectures or self-study are methods of presenting the material. Written examinations, similar in difficulty and scope to initial examinations, should be administered in accordance with Section 5, Trainee Evaluation.

6.3 Fundamentals Training

The fundamentals continuing training program should maintain and improve technical skills and knowledge. Since basic technical knowledge as well as specialized technical knowledge could be lacking when infrequently repaired or newly supplied equipment breaks down, fundamentals instruction should be provided on a continuing basis.

6.4 Special Training

Special training should be provided to address seldom-used skills, observed problems, or anticipated training needs. Infrequently performed tasks should be evaluated to determine if training is needed. Task difficulty, importance to facility safety and reliability, and As Low As Reasonably Achievable (ALARA) should be used to help determine training needs and required depth of coverage. Written

examinations or performance tests should be administered in accordance with Section 5, Trainee Evaluation.

Special training is recommended to address the following situations:

- Degraded job performance
- Changes to procedures
- Facility modifications
- Industry and in-house operating experience.

6.5 Scheduling and Attendance

Continuing training should be conducted using a published schedule that minimizes interference with facility operational schedules. Topics should be chosen that meet the needs of individuals assigned during the training cycle. Training provided should be of high quality and be responsive to time-sensitive input. Attendance should be mandatory and documented.

7. PROGRAM RECORDS

- Auditable records of each individual's participation and performance in, or exception(s) granted from, the training program(s) should be maintained. Individual training records should include the following (as appropriate): Verified education, experience, employment history, and most recent health evaluation summary
- Training programs completed and qualification(s) achieved
- Latest completed checklists, graded written examinations (with answers corrected as necessary or examination keys) and operational evaluations used for qualification (this requires controlled access to training records to maintain examination security) Lists of questions asked and the examiner's overall evaluation of responses on oral examinations
- Correspondence relating to exceptions granted to training requirements (including justification and approval)
- Records of qualification for one-time-only special tests or operations
- Attendance records for required training courses or sessions.

A historical record that documents initial qualification on each position should be maintained as part of individual training records. For example, if an individual initially qualified in 2006, the record should have the date and name of the qualification entered into it. If more than one qualification is achieved and maintained, the individual training record should contain documentation to that effect.

Upon requalification, records that support the previous qualification may be removed from the record and replaced with the information documenting present qualification. Superseded information should be handled in accordance with procedures contained in *DOE 1324.5B, Records Management Program.*

In addition, records of the training programs (which should include an audit trail documenting the development of and modifications to each program) and evaluations of the effectiveness of those programs should also be maintained.

Qualified Worker Series Certificate Course Topics

The Qualified Worker Series is based on the following applicable codes and standards: OSHA CFR 1910.269; OSHA 1910.Subpart S, NFPA 70, NFPA 70 B, NFPA 70 E, NFPA 79, NFPA 77, NFPA 780, IEEE1584, IEEE Green Book, IEEE Emerald Book, IEEE Gray Book, IEEE Red Book, NEMA MG-1and related theory as applied to electrical safety and standards.

The intent of this course is to present the student with information and direction as related to Qualified Electrical Worker needs in real world application.

The following are some of the topics covered in this series.

Topics Include:

- Understand The Four Secrets of Electricity
- Basic Circuitry
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- Three-Phase Power Theory
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- Describe the use of Delta and Wye Connections
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- How to Prevent Electrical Explosion
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- Safety-related maintenance requirements
- Safety requirements for special equipment
- How To Test For Insulation Integrity
- Safe Installation
- Safe Maintenance Standards
- Safe Maintenance of Electrical Equipment
- Which Employees Must Be Trained
- Safe Electrical Work Practice
- Electrically Safe Work Place
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- How To Test cable
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- Definition Of Terms
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- Understanding Power Quality Issues
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