

Electrical Functional Area Qualification Guide

This guide provides a template for a typical electrical functional area qualification program. This guide is intended to be used as a tool to help establish expectations for personnel performing tasks that affect electrical safety and assure that they will be qualified to a minimum standard consistent with their responsibilities and authorities.

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1.0 PURPOSE

This procedure provides a guide for contractors to use to develop electrical functional area qualification standards for personnel with positions that involve electrical safety, electrical work planning, electrical design, electrical testing, research involving electrical energy and/or work activities involving exposure to electrical energy that is not reduced to a safe level by installed engineered barriers.

2.0 SCOPE

This guide is designed to address employees responsible for management, design, safety, testing, maintenance, decommissioning, inspection and installation of electrical systems and components. The basic premise of this guide is that personnel qualifications should be based on the specific requirements of their assignment addressing qualification requirements for electrical workers, engineers and interpretive authorities for electrical safety and code requirements.

Specific requirements particular to an individual sub-project and hazards unrelated to electrical energy, e.g., nuclear or chemical hazards within a groundwater treatment facility or dust and debris protection within a facility demolition project boundary, are not included in this guide.

3.0 IMPLEMENTATION

The process described in this guide relies primarily on maintaining a record of an employee's background, experience and training related to the performance of electrical assignments, their manager's assessment of the hazards involved in the performance of these assignments and documented validation of the employee's ability to perform these assignments safely.

The Core Requirements Matrix (Attachment 1), Required Reading Matrix (Attachment 2), and Training Matrix (Attachment 3), are examples of typical qualification requirements for the electrical functional area personnel.

4.0 GENERAL REQUIREMENTS

All personnel performing tasks involving electrical energy must demonstrate to a Qualifying Official that they are qualified to perform their assignments.

Qualification is defined in this guide as satisfactory completion of a basic set of Core Requirements, Required Reading, and Training as described in the Requirements Matrices in Attachment 1, 2 and 3. Completion records of the qualification requirements are maintained in a retrievable documentation package approved by a Qualifying Official.

Failure to maintain qualification may result in the loss of qualification and the appointment of other personnel for assigned tasks.

Attachment 1 identifies core competency qualification activities.

Attachment 2 identifies "Required Reading" recommendations.

Attachment 3 identifies electrical functional area training modules.

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5.0 DEFINITIONS

Access: Demonstrate user accessibility to information necessary to perform a qualification activity.

Discuss: Present evidence through discussion, presentation, questions and answers with the Electrical SME that the qualification activity could be performed successfully.

Electrical / I&C Engineer (Elect / I&C Engr): An electrical / I&C engineer involved in design, operation and maintenance of Important to Safety, Defense in Depth and General Service electrical systems and components.

Electrical Safety Authority Having Jurisdiction (Elect Safety AHJ): A qualified person who provides interpretation of electrical safety requirements, e.g., NFPA 70E, OSHA, IEEE, DOE Electrical Safety Manual, etc as implemented by the DOE contract in force for a particular activity and/or facility and communicates interpretations to the DOE and other contractors when appropriate. The Electrical Safety AHJ is formally approved by a DOE site officer.

Electrical Safety Officer (Elect Safety Officer): The Electrical Safety Officer is the safety program administrator. The Electrical Safety Officer implements the electrical safety interpretations of the Electrical Safety AHJ.

Electrical Safety Professional (Elect Safety Prof): The Electrical Safety Professional is the industrial safety professional in the field monitoring electrical work activities for worker safety and compliance with electrical safety procedures.

Electrical Subject Matter Expert (Elect SME): A technical expert in a particular electrical field. An Electrical SME may be called upon to mentor a candidate and evaluate the candidate's proficiency for specific qualification activities.

Electrical System Engineer (Elect System Engr): An electrical / I&C engineer involved in design, operation and maintenance of Vital Safety Systems (Safety Significant and Safety Class).

Electrical Worker (Elect Worker): An employee or supervisor involved in work activities with potential exposure to electrical energy that is not reduced to a safe level by installed engineered barriers.

Familiarity: The ability to demonstrate a user level of knowledge for a qualification activity.

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Knowledge: Having taken a written test, oral exam or documenting an observation of a specified task to establish proficiency for a qualification activity.

National Electrical Code Authority Having Jurisdiction (NEC AHJ): A qualified person who provides interpretations of NFPA 70, National Electrical Code.

Perform: Submit evidence that a qualification activity was completed by actually doing the activity to accomplish a task.

Simulate: Submit evidence that a qualification activity was completed using simulated inputs and outputs.

Qualifying Official: The Qualifying Official is the person responsible for establishing/approving electrical functional qualification standards and is the approval authority for successful completion of qualification activities.

Qualification Card: A document signed by the Qualifying Candidate stating that the Qualifying Candidate has completed all the assigned electrical qualification activities and understands the responsibilities associated with the electrical functional area qualification. The Qualification Card, at a minimum, must be approved by the Qualifying Official and may reasonably include approval by Human Resources, Line Management and/or the Plant Manager.

6.0 PROCESS

The qualification process to qualify an individual for a specific task or category of tasks requires at a minimum, the candidate's manager to establish qualification requirements and a Qualifying Official to mentor the candidate and to validate completion of qualification requirements. In some cases the candidate's manager and the Qualifying Official could be the same person. Depending on the background, experience and previous qualifications of the candidate, Human Resources, Training and other support organizations may also become involved.

Candidate seeking Qualification:

- Submit a resume
- Submit evidence of education, experience, training and certifications
- Complete the required activities as identified by the Qualifying Official
- Notify the Qualifying Official of changes affecting progress toward qualification.

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Qualifying Official:

- Communicate expectations to the prospective candidate in writing
- Identify requirements using the Electrical Functional Area Qualification Matrix
- Develop a Qualification Card specific to the candidate's anticipated task assignments
- Discuss equivalencies if applicable
- Approve Qualification Card.

Candidate's Manager:

- Identify qualifications required to perform assigned tasks
- Establish a baseline time table for completion of the qualification requirements
- Monitor the progress of the candidate toward qualification
- Appoint mentors to assist the candidate through the qualification process
- Appoint evaluators to provide confirmation of activity completion
- Maintain a record of completed candidate qualification documentation
- Assemble a retrievable, approved qualification package for the candidate
- Notify the candidate of changes to the qualification process and procedures.

Resources:

- Institute of Electrical and Electronics Engineers (IEEE)
- The Instrumentation, Systems and Automation Society (ISA)
- National Fire Protection Association (NFPA)
- DOE Standard, DOE-STD-1170-2006, *Electrical Functional Area Qualification Standard*
- DOE Fundamentals Handbook, DOE-HDBK-1011/1-92, *Electrical Science*, Volume 1, 2, 3, and 4
- DOE Handbook, DOE-HDBK-1092-2004, *Electrical Safety*
- National Institute for Occupational Safety and Health (NIOSH), *Electrical Safety*
- Occupational Health and Safety Administration (OSHA).

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Attachment 1

CORE COMPETENCIES

P-Perform, S-Simulate, D-Discuss

Initial/Date	Qualification Activity	Elect Worker	Elect Des Engr	Elect System Engr	Elect Code AHJ	Elect Safety Prof	Elect Safety Officer	Elect Safety AHJ
	GENERAL							
	Provide Transcripts of Relevant Education	P	P	P	P	P	P	P
	Provide Proof of Professional Licenses and Certifications	P	P	P	P	P	P	P
	Provide Records of Relevant Professional Training	P	P	P	P	P	P	P
	Provide Evidence of Relevant Professional Experience	P	P	P	P	P	P	P
	Complete Qualification Card (generated by Qualifying Official)	P	P	P	P	P	P	P
	SAFETY							
	Describe Technical Safety Requirements	D	D	D	D	D	D	D
	Describe Limiting Conditions for Operation	D	D	D	D	D	D	D
	Describe Safety Boundary	D	D	D	D	D	D	D
	Describe Safety Basis System Operability	D	D	D	D	D	D	D
	OPERATIONS							

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CORE COMPENTENCIES

P-Perform, S-Simulate, D-Discuss

Initial/Date	Qualification Activity	Elect Worker	Elect Des Engr	Elect System Engr	Elect Code AHJ	Elect Safety Prof	Elect Safety Officer	Elect Safety AHJ
	Participate in the Development of a Maintenance Work Package	D	P	P	P	P	P	P
	Participate in a Third Party Inspection or Electrical Inspection	D	P	P	P	P	P	P
	Participate in an Electrical System Acceptance Test	D	P	P	P	P	P	P
	Participate in an Electrical As-Built Field Verification	D	P	P	P	P	P	P
	QUALITY ASSURANCE							
	Disposition an Electrical Non Conformance Report		S	S	S			S
	Prepare a Procedure Change Request		S	S				
	Perform an Electrical Design Verification		S	S				
	Prepare a Quality Assurance Inspection Plan		S	S				
	Prepare an Electrical Acceptance Test Procedure		S	S				
	TECHNICAL							
	Prepare an Electrical Facility Modification Package		S	S				
	Develop Preventative Maintenance Requirements		S	S				
	Add a Component to the Calibration/Maintenance Recall System		S	S				

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Attachment 2

"REQUIRED READING" MATRIX								
K - Knowledge, F - Familiarity, A - Access								
Initial/Date	Qualification Activity	Elect Worker	Elect Design Engr	Elect System Engr	Elect Code AHJ	Elect Safety Prof	Elect Safety Officer	Elect Safety AHJ
	GENERAL							
	Requirements Management	A	A	A	A	A	A	A
	SAFETY							
	Electrical Severity Measurement Tool		F	F		F	F	F
	Electrical Safety and Hazards Awareness	K	K	K	K	K	K	K
	Safety Basis Requirements	A	A	K	A	A	A	A
	Event/Near Miss Investigation and Critique Process		F	F		K	K	K
	OPERATIONS							
	Startup Readiness		F	F				
	Occurrence Reporting	F	F	F		F	F	F
	Lockout/Tagout	K	K	K	K	K	K	K
	Hold Point Application in Technical Work Documents	F	F	F		F	F	F

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"REQUIRED READING" MATRIX

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Initial/Date	Qualification Activity	Elect Worker	Elect Design Engr	Elect System Engr	Elect Code AHJ	Elect Safety Prof	Elect Safety Officer	Elect Safety AHJ
	QUALITY ASSURANCE							
	Review and Approval of Technical Documents		F	F	F	F	F	F
	Corrective Action Management					F	F	F
	Graded Approach		K	K	K	K	K	K
	Nonconforming Items		F	F	F	F	F	F
	Control of Suspect/Counterfeit items	K	K	K	K	K	K	K
	Performance Indicators					A	A	A
	TECHNICAL							
	DOE Fundamentals Handbook, Electrical Science		A	A	A			A
	Work Management	F	F	F	F	F	F	F
	Job Hazard Analysis Preparation	K	K	K	K	K	K	K
	National Electrical Code - NFPA 70	F	F	F	K	F	F	F
	Standard for Electrical Safety in the Workplace - NFPA 70E	F	F	F	F	F	K	K

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TRAINING MATRIX

K - Knowledge, F - Familiarity, A - Access

Initial/Date	Qualification Activity	Elect Worker	Elect Design Engr	Elect System Engr	Elect Code AHJ	Elect Safety Prof	Elect Safety Officer	Elect Safety AHJ
	TECHNICAL							
	EFCOG Electrical Safety Web Site	A	A	A	A	F	F	F
	OSHA Electrical Safety Requirements	A	A	A	A	K	K	K