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I. Introduction

A. Purpose:
   i. The purpose of this standard is to define the minimum requirements to provide a practical safe working area for employees relative to the hazards arising from the use of electricity.
   ii. Each site and/or group shall implement a program which meets the minimum requirements of this standard, and any Federal, State, or Local laws. Under certain circumstances, local requirements may supersede the requirements in this standard. Such site specific requirements shall be documented with the Site Intel EHS Electrical Safety Program Owner. See Appendix I - Site Specific Requirements.

B. Scope
   i. This standard addresses electrical safety requirements that are necessary for the practical safeguarding of employees during activities such as the installation, operation, maintenance, testing, and demolition of electric conductors, electric equipment, signaling and communications conductors and equipment, and raceways/cable containment.
   ii. This standard applies to all Intel and CW employees, contractors, sub-contractors, or any other such employee who performs work with, on, or around electrical equipment, circuitry, and systems.
   iii. The term “Employee” contained in this document shall apply and refer to all mentioned in ii. of this section.
   iv. The term “Employer” contained in this document shall apply to any manager, supervisor, or owner of a company that has employees working at Intel as referenced in section ii. of this section.

II. General Requirements for Electrical Safety-Related Work Practices

A. Responsibility
   i. The safety-related work practices contained in this standard shall be implemented by employees. The employer shall provide the safety-related work practices and shall train the employee who shall then implement them.

B. Relationships with Employers
   i. Intel Sponsor Responsibilities
      1. Intel sponsor shall inform contract employers of:
         a. Known hazards that are covered by this standard, that are related to the contract employer’s work, and that might not be recognized by the contract employer or its employees.
         b. Information about the employer’s installation that the contract employer needs to make the assessments required by this standard.
         c. The required documented training per this standard.
      2. Intel sponsor shall report observed employee related violations of this standard to the employer or by contractual agreement on escalation process between Intel and the employer.
   ii. Employer Responsibilities
      1. The employer shall ensure that each of his or her employees is instructed in the hazards communicated to the contract employer by the Intel Sponsor. This instruction is in addition to the basic training required by this standard.
      2. The employer shall ensure that each of his or her employees follows the work practices required by this standard and safety-related work rules required by Intel.
      3. The employer shall advise the Intel Sponsor of:
         a. Any unique hazards presented by the employer’s work,
         b. Any unanticipated hazards found during the employer’s work that the Intel Sponsor did not mention, and
c. The measures the employer took to correct any violations reported by the Intel Sponsor and to prevent such violation from recurring in the future.

4. The employer shall provide formal training to all affected employees when a change is made to the employer’s electrical safety program.

5. All short-term employers (i.e. 1 to 2 days) shall conform to the Intel Electrical Safety Standard. The Employer must be qualified to perform the work per the governing regulatory agency’s requirements. The employer must be escorted and have an Intel qualified person responsible for obtaining all permits and providing other assistance to ensure safe performance of the work.

C. Training Requirements
   i. Safety Training
      i. The training requirements contained in this section shall apply to all employees that are exposed to electrical hazards.
      ii. Such employees shall be trained to understand the specific hazards associated with electrical energy.
      iii. Such employees shall be trained in safety-related work practices and procedural requirements, as necessary, to provide protection from the electrical hazards associated with their respective job or task assignments.
      iv. Employees shall be trained to identify and understand the relationship between electrical hazards and possible injury.
      v. Employees exposed to shock hazards shall be trained in methods of release of victims from contact with exposed energized electrical conductors or circuit parts.
      vi. Employees shall be trained in methods of resuscitation (CPR), first aid, and emergency procedures if their duties warrant such training. Training of employees shall be certified by the employer based on organizational bodies (i.e. Red Cross) that provides such training. Training shall comply with state or country requirements as a minimum. ERT/ORT may meet these duties if properly trained and remain out of any electrical hazardous boundaries as defined by this standard.

   ii. Employee Training
      i. Qualified Person - A qualified person shall be trained and knowledgeable of the construction and operation of equipment or a specific work method and be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method.
         1. Such persons shall also be familiar with the proper use of the special precautionary techniques, personal protective equipment, including arc-flash, insulating and shielding materials, and insulated tools and test equipment. A person can be considered qualified with respect to certain equipment and methods but still are unqualified for others.
         2. Such persons permitted to work within the Limited Approach Boundary of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall, at a minimum, be additionally trained in all of the following:
            a. The skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment.
            b. The employee shall be able to demonstrate proficiency in the use of a voltage meter. The skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts.
            c. The approach distances specified in this standard and the corresponding voltages to which the qualified person will be exposed.
            d. The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.
3. An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated and documented an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person shall be considered to be a qualified person for the performance of those duties.

4. Tasks that are performed less often than once per year shall require retraining before the performance of the work practices involved.

5. Employees shall be trained to select an appropriate voltage detector and shall demonstrate how to use a device to verify the absence of voltage, including interpreting indications provided by the device. The training shall include information that enables the employee to understand all limitations of each specific voltage detector that may be used.

ii. Unqualified Persons - Unqualified persons shall be trained in and be familiar with any of the electrical safety related practices necessary for their safety.

iii. Re-Training - An employee shall receive additional training (or retraining) under any of the following conditions:
   1. If the supervision or annual inspections indicate that the employee is not complying with the safety-related work practices
   2. If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those that the employee would normally use
   3. If he or she must employ safety-related work practices that are not normally used during his or her regular job duties

iv. Training Documentation
   1. The employer shall document that each employee has received the training that is equivalent or exceeds the minimal requirements in this section. This documentation shall be made when the employee demonstrates proficiency in the work practices involved and shall be maintained for the duration of the employee’s employment. The documentation shall contain each employee’s name and dates of training.
   2. For CW employees, contractors, subs, or any other such employee who performs work with, on, or around electrical equipment, circuitry, and systems, equivalent training records shall be submitted to the Intel sponsor documenting that the employee meets the requirements of this standard.

v. Electrical Safety Training Requirement Matrix

<table>
<thead>
<tr>
<th>Course</th>
<th>General Employee (as required by job specific need)/ Unqualified Persons</th>
<th>Qualified Person and Qualified Buddy</th>
<th>Managers of Qualified Person/Buddy and Engineers that support Qualified Persons</th>
<th>Senior Manager Permit Approvers and Delegates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Electrical Safety Course ID – WBT 00001502</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>Electrical Safety Course ID – 00001503</td>
<td>X</td>
<td></td>
<td>X**</td>
<td>**1 time per major revision</td>
</tr>
<tr>
<td>Electrical Safety Annual Recert. Course ID – WBT 00019190</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment Specific Training</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### D. Working While Exposed to Electrical Hazards

#### i. General

Safety-related work practices shall be used to safeguard employees from injury while they are exposed to electrical hazards from electrical conductors or circuit parts that are or can become energized. The specific safety related work practices shall be consistent with the nature and extent of the associated electrical hazards.

#### i. Energized Electrical Conductors and Circuit Parts — Safe Work Condition

Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work condition (LOTO) before an employee works within the Limited Approach Boundary of those conductors or parts, unless work on energized components can be justified.

#### ii. Energized Electrical Conductors and Circuit Parts — Unsafe Work Condition

Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have not been put into an electrically safe work condition.

#### ii. Working Within the Limited Approach Boundary of Exposed Electrical Conductors or Circuit Parts that Are or Might Become Energized

Prior to working within the Limited Approach Boundary of exposed electrical conductors and circuit parts operating at 50 volts or more, lockout/tagout devices shall be applied in accordance the Intel Control of Hazardous Energies Standard. If lockout/tagout devices cannot be applied, the requirements of this standard for electrical energized work shall apply.

#### i. Electrical Hazard Analysis

If the energized electrical conductors or circuit parts operating at 50 volts or more are not placed in an electrically safe work condition, other safety-related work practices shall be used to protect employees who might be exposed to the electrical hazards involved.

1. Such work practices shall protect each employee from arc flash and from contact with energized electrical conductors or circuit parts operating at 50 volts or more directly with any part of the body or indirectly through some other conductive object.
2. Work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the energized electrical conductors or circuit parts.
3. Appropriate safety related work practices shall be determined before any person is exposed to the electrical hazards involved by using both shock hazard analysis and arc flash hazard analysis.

   ii. **Energized Electrical Work Permit.** When working on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition (i.e., for the compelling reason of increased or additional hazards or infeasibility), work to be performed shall be considered energized electrical work and shall be performed by written permit only.

   iii. **Unqualified Persons.** Unqualified persons shall not be permitted to enter spaces that are required to be accessible to qualified employees only, unless the electric conductors and equipment involved are in an electrically safe work condition.

   iv. **Safety Interlocks.** Only qualified persons following the requirements for working inside the Restricted Approach Boundary shall be permitted to defeat or bypass an electrical safety interlock over which the person has sole control, and then only temporarily while the qualified person is working on the equipment. The safety interlock system shall be returned to its operable condition when the work is completed.

**III. Establishing an Electrically Safe Work Condition**

   **A. General Requirements**

      i. All electrical circuit conductors and circuit parts shall be considered energized until the sources of energy are removed, and verified to be zero volts, at which time they shall be considered deenergized.

         1. All electrical conductors and circuit parts shall not be considered to be in an electrically safe work condition until all of the applicable requirements of this section have been met.

         2. Electrical conductors and circuit parts that have been disconnected, but not under lockout/tagout, tested, and grounded (where appropriate) shall not be considered to be in an electrically safe work condition, and safe work practices appropriate for the circuit voltage and energy level shall be used.

         3. Lockout/tagout requirements shall apply to fixed, permanently installed equipment, to temporarily installed equipment, and to portable equipment.

         4. For metering and testing to verify 0V, equipment and circuit parts shall be considered energized and the requirements in this standard for permitting, shock hazard protection, and arc flash hazard protection shall apply until Zero Volts 0V is verified.

   **B. Process of Achieving an Electrically Safe Work Condition**

      i. An electrically safe work condition shall be achieved when verified by the following process:

         1. Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.

         2. After properly interrupting the load current, open the disconnecting device(s) for each source.

         3. Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the fully disconnected position.

         4. Apply lockout/tagout devices in accordance with the Intel Control of Hazardous Energies Standard.

         5. Use an adequately rated voltage detector to test each phase conductor or circuit part to verify they are deenergized. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Before and after each test, determine that the voltage detector is operating properly. When test instruments are used for the testing for zero voltage on conductors or circuit parts, the operation of the test instrument shall be verified before and after testing for zero voltage (3-point check).

         6. Where the possibility of induced voltages or stored electrical energy exists, ground the phase conductors or circuit parts before touching them. Where it could be reasonably
anticipated that the conductors or circuit parts being deenergized could contact other exposed energized conductors or circuit parts, apply ground connecting devices rated for the available fault duty. Requirements for the application of temporary grounding equipment are listed in Section IV.H.ii below.

IV. Work Involving Electrical Hazards

A. Justification for Work
   i. Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works within the Limited Approach Boundary of those conductors or parts.
      1. Energized work shall be permitted where the employer can demonstrate that deenergizing introduces additional or increased hazards. See Appendix E-EEW Compelling Reason Guidance Tool/EEW Infeasibility Matrix.
      2. Energized work shall be permitted where the employer can demonstrate that the task to be performed is infeasible in a deenergized state due to equipment design or operational limitations. See Appendix E-EEW Compelling Reason Guidance Tool/EEW Infeasibility Matrix.
      3. Energized electrical conductors and circuit parts that operate at less than 50V shall not be required to be deenergized where the capacity of the source and any overcurrent protection between the energy source and the worker are considered and it is determined that there will be no increased exposure to electrical burns or to explosion due to electric arcs.
   ii. When required by this standard, an electrically safe work condition shall be achieved in accordance with the Intel Corporate Control of Hazardous Energies Standard.

B. Energized Electrical Work Permit
   i. When working on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition (i.e., for the reasons of increased or additional hazards or infeasibility), work to be performed shall be considered energized electrical work and shall be performed by written permit only. See Appendix B-Energized Electrical Work Permit.
      1. Work performed within the Limited Approach Boundary of energized electrical conductors or circuit parts by qualified persons related to tasks such as testing, troubleshooting, voltage measuring, etc., shall be permitted to be performed without an energized electrical work permit, provided appropriate safe work practices and personal protective equipment in accordance with this standard are provided and used.
      2. If the purpose of crossing the Limited Approach Boundary is only for visual inspection and the Restricted Approach Boundary will not be crossed, then an energized electrical work permit shall not be required.
      3. EEW Permitting Details
         a. The most senior manager (Employer) or their authorized delegates shall approve EEW permits.
         b. Senior managers and their authorized delegates shall have the appropriate understanding of the operation, consequences, risks and "infeasible shutdown" criteria to make the decision to approve an EEW Permit.
         c. EHS shall maintain a list of the Intel Permit Approvers for each organization or in the absence of on-site EHS personnel, a designee shall be assigned.
         d. The Intel Permit approver shall ensure that a compelling reason for performing electrical energized work is provided on the EEW permit and the situation meets the requirements for performing energized work as described in Appendix E- EEW Compelling Reason Guidance Tool/EEW Infeasibility Matrix.
         e. The Intel Corporate EEW Permit shall meet or exceed all elements contained in Appendix B.
         f. The scope of work shall be documented in the permit and understood by all parties involved.
g. The EEW permit shall be posted at the work site.

h. Closed permits shall be archived and retained for a minimum of one year by EHS or their site designee, and longer where local requirements dictate.

i. All sites shall follow the minimum steps for processing EEW permits provided in Appendix F- EEW Decision Process Flow Chart.

j. The EEW Permitting Program shall be annually audited for compliance.

C. Shock Hazard Analysis

i. A shock hazard analysis shall determine the voltage to which personnel will be exposed, boundary requirements, and the personal protective equipment necessary in order to minimize the possibility of electric shock to personnel.

1. Limited Approach Boundary. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.

   a. An unqualified person(s) shall not enter the Limited Approach Boundary unless a qualified person advises him or her of the possible hazards and continuously escorts the unqualified person(s) while inside the Limited Approach Boundary.

   b. A qualified person is permitted to perform work related to tasks such as visual inspections, testing, troubleshooting, voltage measuring, etc. within the Limited Approach Boundary.

   c. Employees shall not approach or take any conductive items into the Limited Approach Boundary. These items include, but are not limited to watches, bracelets, rings, conductive framed glasses, earrings, badge clips and clothing with metal snaps and buttons. If conductive items cannot be removed, they must be covered with a properly rated, insulating material.

   d. Employees shall use insulated tools/equipment when working inside the Limited Approach Boundary.

2. Restricted Approach Boundary. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased risk of shock, due to electrical arc/flash over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.

   a. Under no circumstance shall an unqualified person(s) be permitted to cross the Restricted Approach Boundary.

   b. A qualified person(s) shall not enter the Restricted Approach Boundary unless appropriate insulating materials are used to insulate the worker from the energized part.

      i. Employees shall wear properly rated rubber insulating gloves/sleeves with leather protectors when hands/arms are inside the Restricted Approach Boundary.

3. Prohibited Approach Boundary. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which work is considered the same as making contact with the electrical conductor or circuit part.

   a. The Prohibited Approach Boundary must not be crossed unless the above requirements for an Electrical Work Permit section are met.

### Shock Protection Boundaries

<table>
<thead>
<tr>
<th>Nominal System Voltage Range, Phase to Phase</th>
<th>Limited Approach Boundary²</th>
<th>Restricted Approach Boundary²</th>
<th>Prohibited Approach Boundary²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>50 to 300</td>
<td>1.07m (3ft-6in)</td>
<td>Avoid Contact</td>
<td>Avoid Contact</td>
</tr>
<tr>
<td>301 to 750</td>
<td>1.07m (3ft-6in)</td>
<td>304.8mm (1ft-0in)</td>
<td>25.4mm (0ft-1in)</td>
</tr>
<tr>
<td>751 to 15 kv</td>
<td>1.53m (5ft-0in)</td>
<td>660.4mm (2ft-2in)</td>
<td>177.8mm (0ft-7in)</td>
</tr>
<tr>
<td>15.1 kv to 36 kv</td>
<td>1.83m (6ft-0in)</td>
<td>787.4mm (2ft-7in)</td>
<td>254mm (0ft-10in)</td>
</tr>
</tbody>
</table>
### Corporate Environmental Health & Safety (EHS) Standard

#### Electrical Safety

<table>
<thead>
<tr>
<th>Nominal System Voltage Range, Phase to Phase(^1)</th>
<th>Limited Approach Boundary(^2)</th>
<th>Restricted Approach Boundary(^2)</th>
<th>Prohibited Approach Boundary(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.1 kv to 46 kv</td>
<td>2.44m (8ft-0in)</td>
<td>838.2mm (2ft-9in)</td>
<td>431.8mm (1ft-5in)</td>
</tr>
<tr>
<td>46.1 kv to 72.5 kv</td>
<td>2.44m (8ft-0in)</td>
<td>991mm (3ft-3in)</td>
<td>661mm (2ft-2in)</td>
</tr>
<tr>
<td>72.6 kv to 121 kv</td>
<td>2.44m (8ft-0in)</td>
<td>1.016m (3ft-4in)</td>
<td>838mm (2ft-9in)</td>
</tr>
</tbody>
</table>

\(^1\) For single–phase systems, select the range that is equal to the system’s maximum phase-to-ground voltage multiplied by 1.732.

\(^2\) The approach boundaries listed are for Exposed Fixed Circuit Parts. Refer to NFPA70E Table 130.2(C) for the approach boundaries for Exposed Movable Conductors.

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### D. Arc Flash Hazard Analysis

i. An arc flash hazard analysis shall determine the Arc Flash Protection Boundary and the personal protective equipment that personnel within the Arc Flash Protection Boundary shall use.

ii. The arc flash hazard analysis shall be updated when a major modification or renovation takes place. It shall be reviewed periodically, not to exceed five years, to account for changes in the electrical distribution system that could affect the results of the arc flash hazard analysis.

iii. The arc flash hazard analysis shall take into consideration the design of the overcurrent protective device and its opening time, including its condition of maintenance.

1. **Arc Flash Protection Boundary.** When an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur.

2. An incident energy analysis shall be performed to calculate and document the incident energy exposure of the worker, based on the working distance of the employee’s face and chest areas from a prospective arc source for the specific task to be performed.

3. **Arc Flash incident energy and arc flash boundary calculations shall be based on IEEE 1584 - Guide for Performing Arc Flash Hazard Calculations.**
   a. In those cases where detailed arc flash hazard analysis calculations are not performed for systems that are between 50 and 600V, the Arc Flash Boundary shall be 4ft based on the product clearing time of 2 cycles (.033sec) and the available fault current of 50kA, or any combination not exceeding 100 kA cycles (1667 ampere seconds). When the product of the protection device of clearing time of 2 cycles and bolted fault current exceeds 100 kA cycles, the Arc Flash Protection Boundary shall be calculated.
   b. At voltage levels above 600V, the Arc Flash Protection Boundary shall be the distance at which the incident energy equals 5 J/cm\(^2\) (1.2 cal/cm\(^2\)) based on calculations per IEEE 1584.
   c. Where selected in lieu of the incident energy analysis, Appendix H–Alternative Arc Flash PPE Selection Matrix, may be used to determine the hazard/risk category and requirements for use of rubber insulating gloves and insulated tools for a task. The assumed maximum short circuit current capacities and maximum fault clearing times for various tasks are listed in the notes of the appendix. For tasks not listed or for power systems with greater than the assumed maximum short circuit current capacity or with longer than the assumed maximum fault clearing times, arc flash calculations shall be required.

4. When working within the Arc Flash Protection Boundary, Arc-Rated clothing and other personal protective equipment shall be used by the employee based on the incident energy exposure associated with the specific task.

5. All parts of the body inside the Arc Flash Protection Boundary shall be protected.
   a. Recognizing that incident energy increases as the distance from the arc flash decreases, additional PPE shall be used for any parts of the body that are closer than the distance at which the incident energy was determined.
6. Employees that commonly perform work within the arc flash protection boundary of electrical equipment, shall be provided, and shall use, “everyday wear” flame-resistant (FR) clothing with a minimum Arc Thermal Protective Value (ATPV) rating of 8 to meet PPE Cat #2 requirements.
   a. Layering of FR clothing shall be permitted to accommodate for employee comfort. The rating of the layered clothing shall not exceed the rating of the highest layer, unless documented by manufacturers testing data.
   b. Manufacturers care instructions shall be followed for flame-resistant clothing.

7. Electrical equipment that is likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked with a label containing the available incident energy or required level of arc flash PPE, as indicated below:
   a. Electrical Distribution Equipment/Industrial Control Panels
      i. Electrical equipment such as switchgear, switchboards, panelboards, industrial control panels, VFDS, disconnects, transformers and motor control centers shall be field marked with a label containing the available incident energy or required level of arc flash PPE.
   b. Utilization Equipment
      i. No labels are required for utilization equipment if equipment does not contain components listed above (7.a.i).
      ii. In lieu of labeling, an arc flash hazard analysis must be completed to determine proper level of arc flash PPE prior to work.
   c. In the absence of an equipment label, an arc flash analysis shall be performed prior to beginning work.

8. An electrical safety assessment shall be performed to determine if arc flash energy can be temporarily reduced while work is performed.

9. No work shall take place inside the Arc Flash Boundary of equipment with incident energy greater than 40 cal/cm².

10. Engineering review of overcurrent device settings shall be performed during design to permanently minimize the arc flash hazard at electrical distribution equipment and/or utilization equipment.
    a. Example: Adjust tool feeder circuit breaker instantaneous setting to reduce arc flash incident energy to PPE#0 level to avoid FR clothing requirements in clean room.
    b. The goal is to reduce everything to PPE#0 by means of engineering out the most hazardous category down to lower levels. If this can’t be accomplished, an approved clean room FR suit will be required.

11. For equipment in clean room areas where the arc flash incident energy cannot be reduced to PPE#0, a process shall be developed with the site micro-contamination team for wearing arc flash rated clothing over the clean room gown.

<table>
<thead>
<tr>
<th>Arc Flash PPE Category</th>
<th>Min Arc Rating (cal/cm²)</th>
<th>PPE Category Details</th>
</tr>
</thead>
</table>
| PPE#0                  | N/A                      | **Protective Clothing** (Non-melting or Untreated Natural Fiber)
|                        |                          | - Long Sleeve Shirt and Pants |
|                        |                          | **Protective Equipment**
|                        |                          | - Safety Glasses or Safety Goggles
|                        |                          | - Hearing Protection ²
<p>|                        |                          | - Leather Gloves ³ (Optional) |</p>
<table>
<thead>
<tr>
<th>Arc Flash PPE Category</th>
<th>Min Arc Rating (cal/cm²)</th>
<th>PPE Category Details</th>
</tr>
</thead>
</table>
| PPE#1                  | 4                        | FR Clothing – Minimum Arc Rating of 4  
|                        |                          | • Long Sleeve Shirt and Pants  
|                        |                          | • Coverall (Alternative)  
|                        |                          | • Face Shield or Arc Flash Suit Hood  
|                        |                          | • Jacket, Parka, Rainwear (Optional)  
|                        |                          | **Protective Equipment**  
|                        |                          | • Hard Hat  
|                        |                          | • Safety Glasses or Safety Goggles  
|                        |                          | • Hearing Protection²  
|                        |                          | • Leather Gloves¹  
|                        |                          | • Leather Work Shoes (Optional)  
| PPE#2                  | 8                        | FR Clothing – Minimum Arc Rating of 8  
|                        |                          | • Long Sleeve Shirt and Pants  
|                        |                          | • Coverall (Alternative)  
|                        |                          | • Face Shield or Arc Flash Suit Hood  
|                        |                          | • Jacket, Parka, Rainwear (Optional)  
|                        |                          | **Protective Equipment**  
|                        |                          | • Hard Hat  
|                        |                          | • Safety Glasses or Safety Goggles  
|                        |                          | • Hearing Protection²  
|                        |                          | • Leather Gloves¹  
|                        |                          | • Leather Work Shoes  
| PPE#2*                 | 8                        | FR Clothing – Minimum Arc Rating of 8  
|                        |                          | • Long Sleeve Shirt and Pants  
|                        |                          | • Coverall (Alternative)  
|                        |                          | • **Face Shield with Balaclava(∗)** or Arc Flash Suit Hood  
|                        |                          | • Jacket, Parka, Rainwear (Optional)  
|                        |                          | **Protective Equipment**  
|                        |                          | • Hard Hat  
|                        |                          | • Safety Glasses or Safety Goggles  
|                        |                          | • Hearing Protection²  
|                        |                          | • Leather Gloves¹  
|                        |                          | • Leather Work Shoes  
| PPE#3                  | 25                       | FR Clothing – Minimum Arc Rating of 25  
|                        |                          | • Long Sleeve Shirt and Pants  
|                        |                          | • Coverall (Alternative)  
|                        |                          | • Arc Flash Suit-Jacket/Pants (Alternative)  
|                        |                          | • Arc Flash Suit Hood  
|                        |                          | • Jacket, Parka, Rainwear (Optional)  
|                        |                          | **Protective Equipment**  
|                        |                          | • Hard Hat  
|                        |                          | • FR Hard Hat Liner (As Required)  
|                        |                          | • Safety Glasses or Safety Goggles  
|                        |                          | • Hearing Protection Required  
|                        |                          | • Arc Rated Gloves¹  
|                        |                          | • Leather Work Shoes  

Notes:  
1. Leather Gloves  
2. Hearing Protection
<table>
<thead>
<tr>
<th>Arc Flash PPE Category</th>
<th>Min Arc Rating (cal/cm²)</th>
<th>PPE Category Details</th>
</tr>
</thead>
</table>
| PPE#4                | 40                      | FR Clothing – Minimum Arc Rating of 40  
- Long Sleeve Shirt and Pants  
- Coverall (Alternative)  
- Arc Flash Suit-Jacket/Pants (Alternative)  
- Arc Flash Suit Hood  
- Jacket, Parka, Rainwear (Optional) |

1. If rubber insulating gloves with leather protectors are required for shock hazard protection, additional leather or arc-rated gloves are not required. The combination of rubber insulating gloves with leather protectors satisfies the arc flash protection requirement.
2. Hearing protection is not required for activities where wearing the protection creates a greater hazard.

### E. Personal Protective Equipment

i. Employees working in areas where electrical hazards are present shall be provided with, and shall use, protective equipment that is designed and constructed for the specific part of the body to be protected and for the work to be performed.

ii. Electrical protective equipment shall be maintained in a safe, reliable condition.

iii. Protective equipment shall be inspected for damage before each use and immediately following any incident that could have caused damage to the protective equipment.

iv. Insulating gloves/sleeves shall be given an air test, along with the inspection.

v. Electrical protective equipment shall be subjected to periodic electrical tests in accordance with manufacturer’s requirements and appropriate local standards.

1. In the absence of a local standard for testing equipment, a deviation form shall be submitted detailing how the site will test in lieu of section IV.E.v. requirements.

2. If deviation is submitted, it shall cover how equipment is inventoried, maintained, and cared for. It shall also include details of the disposal of this equipment at the end of the third year of use.

3. Section IV.E.v.1/2. does not apply to US based AMR sites.

vi. PPE that does not pass these inspections should be returned for repair or discarded.

vii. Protective equipment shall be stored in a manner to prevent damage from moisture, dust, or other deteriorating agents.

viii. Rubber insulated gloves, sleeves, and blankets/mats require certification from an approved testing agency, as applicable based on local requirements.

<table>
<thead>
<tr>
<th>Rubber Insulating Equipment</th>
<th>When to Test</th>
<th>Governing Standard for Test Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blankets *</td>
<td>Before first issue, every 12 months thereafter*</td>
<td>ASTM F 479</td>
</tr>
<tr>
<td>Covers *</td>
<td>If insulating value is suspect</td>
<td>ASTM F 478</td>
</tr>
<tr>
<td>Gloves *</td>
<td>Before first issue, every 6 months thereafter*</td>
<td>ASTM F 496</td>
</tr>
<tr>
<td>Line Hose *</td>
<td>If insulating value is suspect</td>
<td>ASTM F 478</td>
</tr>
<tr>
<td>Sleeves *</td>
<td>Before first issue, every 12 months thereafter*</td>
<td>ASTM F 496</td>
</tr>
</tbody>
</table>

*If the insulating equipment has been electrically tested but not issued for service, it may not be placed into service unless it has been electrically tested within the previous 12 months.
Note 1: Safety blankets are used to isolate electrical workers from live contact with energized parts of switchgear, switchboards, buses, concrete floors, etc. The use of blankets shall be implemented only as temporary barrier in an enclosure (switchgear, switchboards, etc) that requires access by electrical personnel to perform work.

Note 2: Rubber insulated devices used in the utility power line work to protect the worker from contact of energized parts of a power system. There are five styles of covers: insulator hoods, dead end protectors, line hose connectors, cable end covers and miscellaneous covers.

Note 3: Rubber Gloves and Leather Protectors are worn any time there is possibility of contact between the hands and energized parts of a power system or equipment. Leather protectors are worn over the rubber gloves to protect them from physical damage due to work or contact with sharp components in energized equipment.

Note 4: Line hose is a rubber insulating device used in utility power line work to protect the electrical worker from contact with energized line of a power system. Line hoes are made in segments of molded and shaped rubber to completely cover sections of energized line when applied.

Note 5: Made of rubber and are worn by workers to protect their arms and shoulders from contact with exposed energized conductors. Used primarily when blankets cannot be used in cramped environments that require the electrical worker to extend beyond the gauntlet of the gloves and expose the arm and shoulder areas.

ix. PPE needed to complete the work safely is to be determined based on an electrical work hazard evaluation.

x. Where additional PPE for non-electrical job hazards is required (e.g. chemical exposure), Site EHS shall determine the most appropriate protection.

F. Insulated Tools and Test Equipment

i. Only qualified persons shall perform testing work within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more.

ii. Employees shall use insulated tools when working inside the Limited Approach Boundary.

iii. Insulated tools, test instruments, equipment, and their accessories:

v. Shall be available and maintained in accordance with the manufacturer’s specifications, and where applicable, all certifications must be kept up-to-date.

vi. Shall be inspected prior to each use.

1. The inspection shall look for damage to the insulation or damage that may limit the tool from performing its intended function or could increase the potential for an incident.

2. If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service, and no employee may use it until repairs and tests necessary to render the equipment safe have been made.

vii. Shall be designed and constructed for the environment to which they will be exposed and the manner they will be used,

viii. Shall meet all applicable ASTM/ANSI/IEC standards and shall be listed by a nationally recognized testing laboratory,

ix. Shall be rated for the circuits and equipment for which they will be used,

x. Appendix F – Considerations for Test Probe/Lead Selection is available for reference when selecting test leads and probes.

xi. Additional information may be found in ANSI/ISA-61010-1 (82.02.01)/UL/IEC 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements, for rating and design requirements for voltage measurement and test instruments intended for use on electrical system 1000 volts and below.

iv. The use of coil type voltage meters (Wiggy) are strictly prohibited due to the increased hazard created by the use of these items.

v. The use of metal fish-tapes is strictly prohibited due to the increased hazard created by the use of these items.

G. Electrical Work Planning
i. Safety signs, safety symbols, or accident prevention tags shall be used where necessary to warn employees about electrical hazards that might endanger them.

ii. Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas containing energized conductors or circuit parts. Conductive barricades shall not be used. Barricades shall be placed no closer than the Limited Approach Boundary, or Arc Flash Boundary, whichever is greater.

iii. If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.

iv. Work in wet or damp work locations shall not be performed until the hazard has been abated. Ground Fault Circuit Interrupters (GFCI), Residual Current Device (RCD), or equivalent must be used when work must be performed in wet or damp locations.

v. All employees who perform work on energized electrical circuits, including work below 50 volts, shall meet the requirements of a qualified person as defined by this standard.

vi. Equipment and systems should be evaluated to identify opportunities to reduce exposure to electrical hazards. This may include revision of work procedures to reduce exposure to energized components or the addition of internal electrical barriers or touch proof electrical components.

1. All such internal barriers shall be installed only after the manufacturer has determined that energized electrical work is necessary for the basic servicing and maintenance of the equipment, and shall be approved by equipment manufacturer.

vii. Electrical Work in Hazardous Locations

1. Work on equipment that is rated for use in hazardous locations that will violate the classified location rating is not permitted. For example, work which requires the opening of explosion proof enclosures in a hazardous location must be performed in a de-energized, locked out and tagged out state.

2. If there is a potential for combustible vapors in a work area, a test of the area must be performed with a combustible gas meter prior to and during the duration of any energized electrical work. Work must be halted immediately if any combustible gas or vapor is detected.

3. Energized electrical work in hazardous locations should be avoided. This work shall only be performed after a thorough analysis has been made to verify the work can be performed safely and approval has been obtained from the responsible manager. The compelling reason must be documented and approved via an EEW permit.

H. Electrical Work Requirements

i. Work on Electrical Equipment in an Electrically Safe Work Condition

1. Includes work on electrical equipment that has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary.

2. The equipment shall be considered energized until an electrically safe work condition exists.

3. Only qualified persons may perform the voltage testing on electrical equipment to verify zero voltage.

4. Follow the Intel Corporate Control of Hazardous Energies Standard to establish an electrically safe work condition.

ii. Work on Electrical Equipment Less Than 50V

1. Includes work on electrical equipment that operates at less than 50V to ground.

   a. Electrical equipment less than 50V may present increased exposure to electrical burns or to explosion due to electric arc and shall be classified the same as 50V or greater electrical equipment.

   b. Energized electrical parts that operate at less than 50 volts to ground shall not be required to be de-energized.

   c. Only qualified persons may perform the voltage testing and work on electrical equipment less than 50V with additional higher voltage exposure in the danger zone.

iii. Work outside Limited Approach Boundary of Electrical Equipment 50V or more, shall be performed by a qualified person.
1. Work outside of the Limited Approach Boundary of energized electrical equipment is permitted without an energized electrical work permit.
2. Includes all work, inspections, testing, etc that is performed while remaining outside of the Limited Approach Boundary (a distance from exposed energized parts).
   a. Includes work and inspection activities near electrical equipment with permanent covers/barriers where there are no exposed energized parts.
3. Work performed outside of the Limited Approach Boundary does not require the use of shock hazard PPE.
4. An Arc Flash Hazard Analysis, per Section IV.D, shall be completed to determine arc flash boundary, arc flash incident energy, and appropriate arc flash PPE.
   a. Work that involves intentional physical interaction with the electrical equipment, and is performed inside the Arc Flash Protection Boundary, requires the use of the proper arc flash PPE.

iv. Work Inside Limited Approach Boundary of Electrical Equipment 50V or More
1. Work inside the Limited Approach Boundary of energized electrical equipment that cannot be placed in an electrically safe work condition, requires an electrical energized work permit.
2. Exceptions to energized electrical work permit:
   a. Work performed within the Limited Approach Boundary by qualified persons related to testing, troubleshooting, voltage measuring, etc. shall be permitted without an energized electrical work permit, provided appropriate safe work practices and PPE are used.
   b. Visual Inspections within the Limited Approach Boundary where the Restricted Approach Boundary will not be crossed, is permitted without an energized electrical work permit.
3. A Shock Hazard Analysis shall be completed to determine the voltage to which personnel will be exposed, boundary requirements, and the appropriate shock protection PPE.
   a. Insulated gloves, and/or sleeves, and insulated tools are required for all work within the Restricted Approach Boundary.
   b. All work, inspections, testing, etc inside the Limited Approach Boundary of electrical equipment greater than 600 volts must be planned with documentation of sequenced steps, safety precautions and equipment needed to perform the job safely. The documentation shall be approved by an electrical engineer or designee approved by management.
   c. For any work on exposed RF circuits, the site Industrial Hygienist shall be contacted prior to performing the work. If shielding or covers are removed, the worker may be exposed to RF radiation hazards that are not protected by electrical PPE.
4. An Arc Flash Hazard Analysis, per Section IV.D, shall be completed to determine the arc flash boundary, arc flash incident energy, and appropriate arc flash PPE.
   a. Work that involves intentional physical interaction with the electrical equipment, and is performed inside the Arc Flash Protection Boundary, requires the use of the proper arc flash PPE.
5. A qualified buddy shall be used as follows:
   a. For all electrical activities that require an energized electrical work permit,
   b. For all activities within the limited approach boundary on equipment above 600V,
   c. For other activities based on the electrical safety assessment, including but not limited to:
      i. Operating circuit breakers/switches with covers opened/removed and no barriers in place to prevent indirect contact.
      ii. Removing/Re-Installing non-hinged metal covers that expose energized parts where there is a potential for contacting the energized parts within the limited approach boundary.
iii. Activities within the limited approach boundary of equipment that are performed by a lone worker. Lone worker is defined by any employee in an area where they are not in visual or verbal contact with a fellow worker. Lone Workers spend much if not all of their normal working hours alone without the support of colleagues or the supervision of superiors.

iv. Non-standard, non-documented, non-routine work activities.

d. If buddy is required he/she shall be available in the immediate location where electrical work is being conducted.

i. If ERT/ORT is providing the CPR/First Aid service, they shall be located in the immediate area outside of the electrical hazardous boundaries.

v. Electrical Safety Assessment

1. An electrical safety assessment shall be completed by the qualified worker(s) prior to performing any work on, or around equipment where electrical hazards may exist. The assessment shall include:

   a. Equipment ID
   b. Work/Hazard Description
   c. Results of the Shock Hazard Analysis
      i. Voltage of Equipment to be worked on
      ii. Limited, Restricted, Prohibited Approach Boundaries
      iii. Will work be completed within these boundaries
      iv. List of required Shock hazard PPE
   d. Results of the Arc Flash Hazard Analysis
      i. Determine arc flash boundary, incident energy at work distance
      ii. Will work be completed within the arc flash boundary
      iii. List of required Arc Flash PPE
   e. Determination of need for EEW Permit
   f. Determination of need for EEW Buddy
      i. A pre-task plan shall document if a buddy is required for all non-standard, non-documented, non-routine tasks.

2. Electrical Safety Assessment Matrix

<table>
<thead>
<tr>
<th>Electrical Equipment/Hazard</th>
<th>Arc Flash Protection Required?</th>
<th>Shock Protection Required?</th>
<th>EEW Permit Required?</th>
<th>EEW Buddy Required?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment in an Electrically Safe Work Condition, or Equipment &lt;50V</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>All Work Activities on Equipment 50V+ when Outside of Limited Approach Boundary</td>
<td>Yes, if inside of Arc Flash Boundary</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Visual Inspection Activities on Equipment 50V+ when Inside of Limited Approach Boundary and Outside of Restricted Approach Boundary</td>
<td>Yes, if inside of Arc Flash Boundary</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Testing, Metering, Troubleshooting Activities on Equipment 50V-600V when Inside of Limited Approach Boundary</td>
<td>Yes, if inside of Arc Flash Boundary</td>
<td>Yes, if inside Restricted Approach Boundary</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>All Other Work Activities on Equipment 50V+ when Inside of Limited Approach Boundary</td>
<td>Yes, if inside of Arc Flash Boundary</td>
<td>Yes, if inside Restricted Approach Boundary</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Electrical Safety

<table>
<thead>
<tr>
<th>Electrical Equipment/Hazard</th>
<th>Arc Flash Protection Required?</th>
<th>Shock Protection Required?</th>
<th>EEW Permit Required?</th>
<th>EEW Buddy Required?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing, Metering, Troubleshooting Activities on Equipment &gt;600V, when Inside of Limited Approach Boundary</td>
<td>Yes, if inside of Arc Flash Boundary</td>
<td>Yes, if inside Restricted Approach Boundary</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

| Other Work Activities on Equipment 600V+, when Inside of the Limited Approach Boundary      | Work Not Allowed              | Work Not Allowed            | Work Not Allowed    | Work Not Allowed    |

3. Electrical Safety Assessment Tool
   a. Appendix A - The Electrical Safety Assessment and Energized Electrical Work (EEW) Permit Tool may be used to meet the requirements set forth in this section.

I. Specific Electrical Safety Requirements
   i. General Rules for Operations on Switchgear Greater than 600V
      1. All switching activities shall be performed by written procedure only and under supervision of the electrical facility engineer.
      2. An electrical safety assessment shall be performed to determine the required PPE which shall be worn at all times while switching.
      3. Non-emergency switching must be planned such that it is complete before midnight, no exceptions without written authorization by the CS Facilities Manager.
      4. Only one switching procedure is to be carried out at a time by any switching team.
      5. The switching procedure shall document the initial configuration of the equipment.
      6. The Operator shall confirm each operational step before and after each step with the Buddy.
      7. All switching procedures should be carried out in their entirety without interruption except in the event of an Emergency (e.g. Site Evacuation).
      8. When a switching procedure is interrupted, the procedure must be walked again to confirm no change in status up to the point where the procedure stopped.
      9. The Buddy must hold Interlock keys (Castel, Fortress, Kirk, etc) while carrying out switching procedures allowing the Operator to perform the switching.
     10. The person carrying out the switching, and the buddy, must be kept to one side of the apparatus being switched such that the area of exposure is minimized.

   ii. Application of Temporary Protective Grounding Equipment
      1. Reason for Applying Grounds.
         a. Discharge residual voltage or charge (in cables and transformers)
         b. Prevent apparatus from becoming accidentally energized
         c. Dissipate induced voltage safely
         d. Prevent build up of static charge
      2. Temporary protective grounds shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault.
      3. Temporary protective grounding equipment shall meet the applicable national standards.
      4. Temporary protective grounds shall have an impedance low enough to cause immediate operation of protective devices in case of accidental energizing of the electric conductors or circuit parts.
      5. Temporary protective grounds shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to hazardous differences in electrical potential.
         a. Prior to application of grounds, ensure the apparatus is disconnected, de-energized, LOTO, and cannot be re-energized.
b. When flexible grounds are being applied, the grounds must be connected first to ground and secondly to the apparatus to be grounded. At no time must the operator be in contact with the flexible leads or the connection devices.

c. When flexible grounds are being removed, the grounds must be removed first from the grounded apparatus and secondly the ground. At no time must the operator be in contact with the flexible leads or the connection devices.

d. Where possible, visually confirm that all phases are correctly grounded and apply LOTO at the point of grounds application.

iii. Reclosing Circuits After Protective Device Operation

1. After a circuit is de-energized by a Circuit Overcurrent Device, the circuit shall not be manually reenergized until it has been determined that the equipment and circuit can be safely energized.

2. The repetitive manual reclosing of circuit breakers or reenergizing circuits through replaced fuses shall be prohibited.

3. When it is determined from the design of the circuit and the overcurrent devices involved that the automatic operation of a device was caused by an overload rather than a fault condition, examination of the circuit or connected equipment shall not be required before the circuit is reenergized.

4. Resetting a tripped protective device without removing the fault poses a safety hazard since the protection device will be closed into the fault and will be required to interrupt the fault current again. The protection device may fail catastrophically. Additionally, resetting the tripped protection device without removing the fault could cause upstream devices to interrupt the fault resulting in expanded loss of electrical power.

iv. UPS Battery Systems

1. Boundaries and minimum requirements:
   a. The Arc Flash boundary of 4’ shall be employed when protective covers/barriers are removed and when work or metering and testing is performed.
   b. Work requiring interconnecting cables to be removed and battery circuitry is greater than 50V requires an approved energized electrical work permit.
   c. PPE Category 2 (8 cal/cm²) FR clothing and PPE (see PPE Category Details section of the document) shall be worn when performing work in the Arc Flash boundary.
   d. PPE for voltage greater than 50V shall be worn until the potential across battery circuitry is below 50V. Rubber insulating gloves can be removed when below 50V but leather gloves shall be worn.
   e. Battery lifts shall be used when the placement or removal of a battery is above waist height. JHA may be used in lieu of mandatory lift requirement.
   f. Apply the use of 1kV rated insulted tools and avoid work practices that could short circuit across battery connections.

2. When acid (Wet cell) exposure is possible, employees shall utilize properly rated chemical protective equipment while working within 18” of exposed battery system terminals or while handling batteries:
   i. Goggle and face shield
   ii. Chemical-resistant gloves
   iii. Protective aprons
   iv. Protective overshoes
   v. A portable or stationary water facility for rinsing eyes and skin in case of electrolyte spillage shall be available

v. Low Voltage/High Current Conditions

1. Non UPS Battery Systems (Stand alone battery, such as life safety, forklifts, cars, etc.).
2. 240VA or greater AC or DC with voltages less than 50V
   a. An EEW Permit is not required.
   b. Requires a documented procedure such as, but not limited to Pre-Task-Plan, Job Hazard Analysis, Preventative Maintenance procedures, etc.
vi. **Rescue Hooks (Sheppard hooks)**
   1. Rescue hooks are not required to be prepositioned at any location per this standard.
   2. Rescue hooks or similar devices are required to be on-hand as a rescue device during all permitted energized electrical work for removal of employees in an electrical shock situation.
   3. Rescue hooks shall be maintained in an environment free of elements that would degrade the dielectric protective qualities. If the manufacture supplies care and maintenance requirements, those shall be followed.

V. **Roles and Responsibilities**

A. **Senior Manager**
   i. Shall read and understand this standard.
   ii. Shall ensure that resources are allocated to support this program.
   iii. Shall work to eliminate or reduce the need for energized electrical work.
   iv. Shall establish means to enforce compliance with the requirements of this standard.
   v. Shall provide a sufficient number of trained personnel to safely perform the work.
   vi. Shall ensure a permitting process is in place and managed for the organization.
   vii. Shall ensure all permits are archived for the EEW Review Committee.
   viii. Shall ensure that an EEW Review Committee meets annually to review approved permits and identify opportunities for improving reduction/engineering controls.
   ix. Shall ensure that this program is regularly audited for compliance.
   x. Shall ensure that all assigned Authorized Delegates are properly qualified.
   xi. Shall provide written notification to Site EHS when Authorized Delegates are assigned or removed.

B. **Authorized Delegate**
   i. Shall read and understand this standard.
   ii. Shall act on behalf of the senior organization manager for approving EEW permits.

C. **Intel Permit Approver (Senior Organization Manager or Authorized Delegates)**
   i. Shall read and understand this standard.
   ii. Shall be capable of making judgments that affect the lives of those doing work when determining infeasibility.
   iii. Shall understand the overall business process or production flow so that educated decisions can be made to schedule the work during times where the systems can be de-energized.
      1. It is not a requirement of the permit approver to have working knowledge of the electrical systems or a background in electrical work. The approver is not determining if the “work area” is safe or that the persons performing the task are properly trained.
   iv. Shall document and/or validate the compelling reason for energized electrical work.
   v. Shall sign the EEW permit for work conducted by Intel personnel and by Contractor personnel.
   vi. Shall attend and participate in the EEW Review Committee meetings.

D. **Qualified Persons Manager**
   i. Shall read and understand this standard.
   ii. Shall verify that all employees performing electrical work have current training certifications and the skills necessary to perform the work.
   iii. Shall understand the scope and hazards associated with the work to be performed.
   iv. Shall sign the EEW permit acknowledging the worker is qualified.

E. **Qualified Person**
   i. Shall read and understand this standard.
   ii. Shall understand and implement the safety related work practices contained in this standard.
   iii. Shall have experience, skills, knowledge, and specific training related to the construction and operation of the specific electrical equipment/installation to be worked on, and shall have safety training on the hazards involved.
   iv. Shall visually inspect all PPE and safety equipment prior to starting work.
   v. Shall be certified per site/local/equipment specific requirements.
   vi. Shall act as a buddy when required.
F. **Qualified Buddy**
   i. Reviews scope of work with qualified person.
   ii. Knows location of disconnects and how to de-energize equipment.
   iii. Shall be trained in methods of release of victims from contact with exposed energized electrical conductors or circuit parts.
   iv. Observes the work without interfering with the worker or participating in the work.
   v. Be prepared to respond to any non-standard situation, including the delivery of CPR/FA in the event of an emergency. ERT/ORT may provide this requirement.
   vi. Determines best emergency procedures prior to beginning work.
   vii. Reviews and signs EEW permit.
   viii. Buddy should be positioned outside of the Flash Protection Boundary (see Definitions) when possible. If the buddy must be inside the Flash Protection Boundary he/she must be wearing equivalent PPE as the person doing the work as specified by the work plan.

G. **Site Environmental Health and Safety**
   i. Defines the audit process to ensure the site’s EEW program health.
   ii. Ensures organizations who conduct EEW are tracking the EEW work being performed. Tracking updates shall consist of:
      1. Number of EEW permits approved
      2. Compelling reasons
   iii. Ensures the EEW Review Committee meets at least annually to review all EEW performed during the year. The purpose of the committee is to review past EEW permits with the intent of minimizing/eliminating future EEW permits. The review team shall consist of at a minimum:
      1. Senior Organizational manager (for the site or single organization)
      2. CS Site Manager
      3. Site EHS Electrical Safety Standard Program Owner
      4. Other attendees may be required based on involvement or per site/organization needs
   iv. Shall maintain the list of Intel Permit Approvers for each organization.
   v. Works with Equipment and/or System Owners to identify engineering controls that will reduce the amount of permit required energized work.
   vi. Engages with new customer managers to educate them in their responsibility of the program.
   vii. Communicates requirements to site senior management and all authorized employees.

H. **Corporate Environmental Health and Safety**
   i. Drive continuous improvement to this standard.
   ii. Approves proposed revisions to this standard and related training.
   iii. Assembles Electrical Safety Work Group annually to review any regulatory changes that require an update to the standard.

I. **Electrical Equipment and System Engineering Owners**
   i. Identify engineering controls that will reduce the amount of electrical energized work.
   ii. Perform Arc Flash Hazard calculations and ensure equipment is properly labeled.

J. **Contractor Sponsors**
   i. Must ensure/verify that all contractors under their supervision that are going to perform EEW are certified to the Federal, State and Local requirements for being a Qualified Person.
   ii. Must ensure that all contractors under their supervision comply with this Electrical Safety Standard, and any applicable local, state, federal, country specific standards.

VI. **Definitions**

   A. **Arc Flash Hazard Analysis**: A study investigating a worker’s potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, arc flash protection boundary, and the appropriate levels of PPE.

   B. **Arc Thermal Protective Value (ATPV)**: Rating to determine the level of flame resistance for treated clothing/fiber designed to reduce the on-set of 2nd degree burns if properly applied.

   C. **Authorized Delegate**: A manager that is assigned and documented by the senior organization manager to act on their behalf for approving EEW permits, who has the appropriate understanding of the business and safety requirements necessary to perform this function.
D. Arc Flash Suit (Blast Suit): A complete flame-resistant clothing and equipment system that covers the entire body, except for the hands and feet. This includes pants, jacket, and beekeeper-type hood fitted with a face shield.

E. Boundary, Arc Flash Protection: When an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur.

F. Boundary, Limited Approach: An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.

G. Boundary, Prohibited Approach: An approach limit at a distance from an exposed energized electrical conductor or circuit part within which work is considered the same as making contact with the electrical conductor or circuit part.

H. Boundary, Restricted Approach: An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.

I. Overcurrent Device: A device capable of providing protection for service, feeder, and branch circuits and in between its rated current and its interrupting rating. Circuit overcurrent protective devices are provided with interruption but no less than 5,000 amperes.

J. Buddy: A qualified person assigned to monitor an individual performing Energized Electrical Work.

K. Buddy System: A safety system used when one person is performing EEW and one person is functioning as a dedicated Qualified EEW Buddy. Both individuals must be qualified per the requirements of this standard. A person may function as an EEW Buddy for two people if they are working on the same system and are both in a single line of sight from a single observation point.

L. Compelling Reason: A situation where greater health, safety or environmental hazard exists if equipment is de-energized or if an essential continuity of service is halted. Examples of “compelling reasons” include: 1) Impact to Emergency Alarms, 2) Impact to Life Support Systems and 3) Infeasible Shutdown.

M. Electrical Hazard: A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

N. Electrically Safe Work Condition – A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with the COHE standard, tested to ensure the absence of voltage, and grounded if determined necessary.

O. Energized: Electrically connected to, or is, a source of voltage.

P. Energized Electrical Work (EEW): Any work within the limited approach boundary of equipment that has not been placed into an electrically safe work condition, including testing for zero voltage.

Q. EEW Permit: Document authorizing qualified personnel to perform installations or repairs on energized electrical equipment and/or systems.

R. Exposed: Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.

S. Ground Fault Circuit Interrupter (GFCI), Residual Current Device (RCD): An electrical device that disconnects a circuit whenever it detects that the electric current is not balanced between the energized conductor and the return neutral conductor. Such an imbalance is sometimes caused by current leakage through the body of a person who is grounded and accidentally touching the energized part of the circuit. A lethal shock can result from these conditions. These devices are designed to disconnect quickly enough to mitigate the harm caused by such shocks although they are not intended to provide protection against overload or short-circuit conditions.

T. Hazardous Locations: Areas in which flammable gases, vapors or dusts are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

U. Testing & Metering: Taking readings or measurements of electrical equipment with approved test instruments.

V. Qualified Person: One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the specific hazards involved. This person must also meet the requirements of this standard. The qualification applies to specific tools or equipment and cannot be universally applied to all tools or equipment.
i. For European Nations, the terms electrically skilled, instructed, and ordinary are used to categorize levels of competency for electrical workers. For the purpose of this standard, an electrically skilled person shall be equivalent to a qualified person.

W. Requester: Generally the requester is the individual or team lead for the team that is responsible for performing the work. The requester may be a contingent worker or an Intel employee.

X. Senior Manager: The senior manager responsible for the factory, data center, lab, test floor, or other area of operation that must assess the situation and determine if work must be done in an energized state due to infeasible shutdown criteria.

Y. System Owner: The Intel employee who is responsible for the system(s) that will be involved in the work. Normally this is a Corporate Services Facilities Engineer, but may be a factory tool owner, lab owner, data center hardware engineer, etc.

Z. Troubleshooting: The systematic search for the source of a problem with a system of electrical components. The typical approach is a process of elimination of components by isolation and testing of components and subsystems. Generally the process starts with the most obvious or easiest to fix problem or component and works toward the most difficult. By its nature, this process requires the testing and evaluation of components that are energized and often requires covers that are normally in place to be removed. Troubleshooting must be limited to well train individuals with experience in this process.

AA. Utilization Equipment: Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes. (Tools, computers, machines, motors, drives, etc - the end-use equipment that uses electricity).

BB. Work Coordinator: The Intel employee who is responsible for the individual or team that will perform the work. This may be a CSC PM, CM, QA/QC tech, an Ops Facilities FLM, Ops Facilities tech, or Facilities Engineer. Generally, the requester and work coordinator will be the same person except when the requester is a contract worker.

CC. Qualified Person Supervisor/Manager: The direct supervisor or manager of the persons performing the work.

VII. Deviations

A. Site EHS will submit any request for deviations to the Corporate Electrical Safety Standard owner. The standard owner will be responsible for assembling 3 or more personnel from the Electrical Safety Workgroup to approve any permanent deviation made that is less or more stringent than this standard. The deviation must be submitted using the form in this standard. See Appendix D- Deviation Form for Electrical Safety Standard Exceptions.

B. The Corporate Electrical Safety Standard owner upon approval of the deviation will permanently file in ICM-TL and post deviation on the Corporate EHS CoHE webpage.

VIII. References

A. Applicable Forms and Documents
   i. 29 CFR 1910, Subpart S, Electrical
   ii. 29 CFR 1926, Subpart K, Electrical
   iii. 29 CFR 1910.137, Electrical Protective Devices
   iv. ANSI Standards Z89.1 (head protection), Z87.1 (eye protection), Z41 (protective footwear)
   v. Intel Control of Hazardous Energies Standard
   vi. National Fire Protection Association Articles 70, 70E and 79
   vii. Any applicable Federal, State or Local requirements
   viii. ASTM Standards for Electrical Protective Equipment
   ix. International Electrical Commission (IEC) non-US sites
   x. ENS0110 – Operation of Electrical Installations
   xi. IEEE 1584 – Guide for Performing Arc Flash Hazard Calculations

IX. Change Control
A. An electrical safety standard change control team shall be in place and review all proposed changes to this standard.
B. All changes to this standard shall be communicated by Corporate EHS Program Owner to Site EHS Manager/Program Owners and affected senior organization personnel.
C. Site EHS Manager/Program Owners shall communicate to all affected site personnel.

<table>
<thead>
<tr>
<th>Date</th>
<th>Rev #</th>
<th>Section</th>
<th>Author</th>
<th>Change Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/2011</td>
<td>1</td>
<td>All</td>
<td>Heath Foott</td>
<td>New Electrical Safety Standard</td>
</tr>
</tbody>
</table>
Appendix A – Electrical Safety Assessment and Energized Electrical Work Permit Tool

The file below is the Intel Electrical Safety Assessment and Energized Electrical Work Permit Tool. The tool consists of two worksheets. The first is the Electrical Safety Assessment Tool that can be used to meet the requirements set forth in Section IV.G.v. The second worksheet is the Intel Corporate Electrical Energized Work Permit. If an EEW permit is required, the information from the Electrical Safety Assessment Tool is automatically transferred to the EEW permit. The requestor can then complete the remaining fields and print the permit out to obtain the appropriate signatures.
# Appendix B – Intel Energized Electrical Work Permit

<table>
<thead>
<tr>
<th>Request Date:</th>
<th>Permit Number:</th>
<th>Requestor Company:</th>
<th>Permit Approval:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Approved</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requestor Name:</th>
<th>Requestor Phone:</th>
<th>Building:</th>
<th>Work Start Date/Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment ID to be Worked On:</th>
<th>Work Finish Date/Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Work Description:

Enter Detailed Description of work to Be Performed:

### Compelling Reason/Impact Statement:

- De-energizing would result in an increased or additional hazard (Emerg Alarms, Life Safety, Ventilation Equip)
- De-energizing is infeasible due to equipment design or operational limitations

Check One and Enter Detailed Description of Compelling Reason/Impacts/Justification for Doing Work Energized:

### Shock Hazard Analysis

<table>
<thead>
<tr>
<th>Max Exposed Voltage:</th>
<th>Arc Flash Boundary:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Limited Approach Boundary:</th>
<th>Arc Flash Incident Energy @ 18&quot;:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Restricted Approach Boundary:</th>
<th>Arc Flash PPE Category @ 18&quot;:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prohibited Approach Boundary:</th>
<th>Min ArcRating</th>
<th>PPECategory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## General PPE

<table>
<thead>
<tr>
<th>Safety Glasses</th>
<th>Insulated Gloves/Leathers</th>
<th>Leather Gloves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Hat</td>
<td>Insulated Tools</td>
<td>Arc Rated Clothing</td>
</tr>
<tr>
<td>Ear Plugs</td>
<td>Arc Rated Face Shield for PPE-1, 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arc Rated Face Shield w/balaclava for PPE-2*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arc Rated Hood for PPE-3, 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leather Work Shoes</td>
<td></td>
</tr>
</tbody>
</table>

## Electrical Energized Work Checklist Complete (attach copy):

**Qualified Worker(s)/Buddy**

*Cease work if either Qualified Person or Buddy to whom permit is issued leaves the location of work*

By signing below, I agree that the work described above can be done safely, certify that I am qualified to carry out the work, certify that my required training is in current status, and that I understand and will follow the electrical policy and all safety procedures necessary to complete the job safely.

<table>
<thead>
<tr>
<th>Qualified Worker #1:</th>
<th>Print:</th>
<th>Sign:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Qualified Worker #2:</th>
<th>Print:</th>
<th>Sign:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Qualified Buddy:</th>
<th>Print:</th>
<th>Sign:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Qualified Worker Supervisor

By signing below, I certify the qualified workers/buddy above are properly trained to perform the electrical energized work described.

<table>
<thead>
<tr>
<th>Print:</th>
<th>Sign:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Intel Permit Approver

By signing below, I certify the compelling reason listed above is valid, meets the Intel requirements, and I authorize this energized electrical work to proceed.

<table>
<thead>
<tr>
<th>Print:</th>
<th>Sign:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix C - Example EEW Permit Checklist

EXAMPLE EEW PERMIT CHECKLIST

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Current EMERGENCY telephone number verified (fill in):</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>Location of nearest telephone (fill in):</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>Location and availability of emergency equipment verified.</td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>Up line breaker has been tagged for facilities panel distribution systems.</td>
<td>Grid (Column)</td>
</tr>
<tr>
<td>E.</td>
<td>Confirmed location of Emergency Power Off (EPO) or Emergency Machine Off (EMO) buttons.</td>
<td></td>
</tr>
<tr>
<td>F.</td>
<td>Safety equipment and meters available and tested for reliability and accuracy.</td>
<td></td>
</tr>
<tr>
<td>G.</td>
<td>Test meter has been calibrated/Employee trained to use meter properly.</td>
<td></td>
</tr>
<tr>
<td>H.</td>
<td>The buddy is to do no other work than observe and ensure that safety procedures are followed.</td>
<td></td>
</tr>
<tr>
<td>I.</td>
<td>Attach to this permit an updated copy of the panel schedule and verify breaker positions.</td>
<td></td>
</tr>
<tr>
<td>J.</td>
<td>Safety issues and hazards in work area reviewed.</td>
<td></td>
</tr>
<tr>
<td>K.</td>
<td>All work procedures reviewed. (If possible, open equipment in de-energized state and review work to be done.)</td>
<td></td>
</tr>
<tr>
<td>L.</td>
<td>Barriers required keeping unauthorized personnel clear of work area.</td>
<td></td>
</tr>
<tr>
<td>M.</td>
<td>Other forms of Hazardous Energy not required for work are properly locked out/tagged out.</td>
<td></td>
</tr>
<tr>
<td>N.</td>
<td>Confirmed adequate illumination. (Flashlights are not acceptable.)</td>
<td></td>
</tr>
<tr>
<td>O.</td>
<td>All conductive personal articles removed.</td>
<td></td>
</tr>
<tr>
<td>P.</td>
<td>Metal fasteners on clothing (zippers, snaps, buttons &amp; pins) on the torso and arms are not exposed.</td>
<td></td>
</tr>
<tr>
<td>Q.</td>
<td>Clear evacuation path identified.</td>
<td></td>
</tr>
<tr>
<td>R.</td>
<td>Tools in good condition. (Check insulation on handles.)</td>
<td></td>
</tr>
<tr>
<td>S.</td>
<td>Appropriate Personal Protective Equipment in place (includes properly rated and tested gloves, sleeves, face shields and blankets).</td>
<td>Rubber Insulated Floor Mats</td>
</tr>
<tr>
<td></td>
<td>Rubber Insulated Gloves</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Approved Insulated Tools</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Non Conductive Safety Glasses</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Face Shield</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Blankets</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Nomex or Equivalent Fire Rated Clothing</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Additional PPE (i.e. safety glasses w/ non-conductive frames, leather gloves, leather work shoes, etc):</td>
<td></td>
</tr>
</tbody>
</table>

CLOSING CHECKLIST - POST SERVICE

Please check each of the following as they are completed:

1. Visual inspection/test done to verify all tools, jumpers, grounds, etc. removed.
2. Affected employees exposed to hazards associated with re-energizing are notified of systems changing status.
3. Visually confirm all employees are clear of circuits and equipment.
4. Equipment re-energized.
5. Barriers removed.
6. PPE returned to storage location.
7. EEW permit and upstream tags (if used) returned.
Appendix D - Deviation Form for Electrical Safety Standard Exceptions

Date:  
Originator:  
Department:  
Site:  
Site safety engineer (Sponsor):  
ESS TEAM Members:  
Date approved:  

1. Briefly explain proposed deviation from the Electrical Safety Standard.

2. Specifically list the current Electrical Safety Standard that requires the deviation.

3. Reason for request.

4. What additional safeguards, if any, will be utilized to reduce risk to an appropriate level?

Process: Site EHS will submit any request for deviations to the Corporate Electrical Safety Standard owner. The standard owner will be responsible for assembling 3 or more personnel from the Electrical Safety Standard team to approve any permanent deviation made that is less or more stringent than this standard. The deviation must be submitted using the form in this standard.

Note: These deviations are the exception and not the rule. Approval will only be given if the request will not increase risk. Safety will not be compromised under any conditions. All exceptions granted before 6/11 are null and void.
## Appendix E - EEW Compelling Reason Guidance Tool / EEW Infeasibility Matrix

### STEP 1: EEW Compelling Reason Guidance Tool.
Intel Permit Approvers may use this table to help determine whether electrical work meets one of the three allowable Compelling Reasons for EEW.

#### No Permit Required

<table>
<thead>
<tr>
<th>EEW COMPELLING REASON</th>
<th>INTEL EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed energized parts (&lt;50 Volts)</td>
<td>Control circuits that impact other systems that could result in a release of another kind of hazardous energy.</td>
</tr>
<tr>
<td>Energized parts that operate at less than 50 volts to ground shall not be required to be deenergized if there is no increased exposure to electrical burns or to explosion due to electric arcs.</td>
<td></td>
</tr>
<tr>
<td>De-energizing is Infeasible due to Equipment Design or Operational Limitations (Exposed energized Parts 50 Volts or Greater)</td>
<td>Metering, testing, IR scanning, startup, diagnostics where equipment must be energized to perform the task.</td>
</tr>
<tr>
<td>Performing diagnostics and testing of electrical circuits that can only be performed with the circuit energized</td>
<td>Visual inspections or IR scanning of systems while remaining outside of the limited approach boundary.</td>
</tr>
</tbody>
</table>

#### EEW Permit Required

<table>
<thead>
<tr>
<th>EEW COMPELLING REASON</th>
<th>INTEL EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Live Parts &lt;50 Volts</td>
<td>In the case of DC batteries it may not possible to isolate an individual battery in a circuit or to interrupt fault current by opening the load protection device.</td>
</tr>
<tr>
<td>Sources of electrical energy that are energized at less than 50 volts can be hazardous. The decision to deenergize should include consideration of the capacity of the source and any overcurrent protection between the energy source and the worker.</td>
<td></td>
</tr>
<tr>
<td>Exposed Live Parts 50V or Greater - De-energizing Introduces Additional or Increased Hazards</td>
<td>Shutdown of critical make-up air and/or exhaust systems that would result in improper pressurization, ventilation, or exhaust conditions.</td>
</tr>
<tr>
<td>Examples include, but are not limited to:</td>
<td>Shutdown of critical waste systems that would result in an environmental excursion.</td>
</tr>
<tr>
<td>* interruption of life support equipment,</td>
<td>Loss of electrical power could result in an environmental spill.</td>
</tr>
<tr>
<td>* de-activation of emergency alarm systems, and</td>
<td></td>
</tr>
<tr>
<td>* shutdown of hazardous location ventilation equipment</td>
<td></td>
</tr>
<tr>
<td>Lack of illumination has been removed to emphasize the fact that temporary lighting could be installed to enable an electrically safe work condition.</td>
<td></td>
</tr>
<tr>
<td>Exposed Live Parts 50V or Greater - De-energizing is Infeasible due to Equipment Design or Operational Limitations</td>
<td>Shutdown of tools that would affect a factory, or other business unit, continuous process in an output constrained situation. (Note that “tool” may refer to a FAB, SORT, LAB, Assembly Test, Computer Room, Data Center, or other business unit piece of equipment.)</td>
</tr>
<tr>
<td>Work on circuits that form an integral part of a continuous process that would otherwise need to be completely shut down in order to permit work on one circuit or piece of equipment.</td>
<td>Shutdown that would result in physical damage to equipment.</td>
</tr>
<tr>
<td>There is a difference between inconvenient and infeasible. An inconvenience DOES NOT justify work on or near exposed live parts.</td>
<td>Shutdown of non-redundant process, mechanical or electrical facility equipment that would affect a continuous process in an output constrained situation.</td>
</tr>
</tbody>
</table>

**NOTE:** If the proposed work falls under this category, the approver must refer to Appendix H (EEW Infeasibility Matrix) for more guidance.
**Corporate Environmental Health & Safety (EHS) Standard**

**Electrical Safety**

**STEP 2: EEW Infeasibility Matrix:**
Infeasibility is a case-by-case determination. This tool is intended to assist EEW permit approvers in determining whether proposed EEW work meets the infeasibility criteria. Even if the tool indicates that EEW is allowed, the Intel Permit Approver must ensure there is no reasonable alternative.

<table>
<thead>
<tr>
<th>Business Impact</th>
<th>50V to 120V</th>
<th>Greater than 120V to less than 600V</th>
<th>600V and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several redundant tools/ equipment/ systems and powering down tools/ equipment/ systems would impact organization’s processing less than 24 hours.</td>
<td>NO EEW Allowed</td>
<td>NO EEW Allowed</td>
<td>NO EEW Allowed</td>
</tr>
<tr>
<td>Some tool/ equipment/ system redundancy and the organization’s intended process has steady flow with little back-log. OR Powering tools/ equipment/ systems down would impact organization’s processing slightly, but would be recoverable within 24-48 hours.</td>
<td>Caution: EEW Allowed with authorized Approver signature</td>
<td>NO EEW Allowed</td>
<td>NO EEW Allowed</td>
</tr>
<tr>
<td>Little or no tool/ equipment/ system redundancy and the organization’s intended process has steady flow with a large back-log. OR Powering down tools/ equipment/ systems would impact organization’s processing moderately, but would be recoverable within 48-60 hours.</td>
<td>Caution: EEW Allowed with authorized Approver signature</td>
<td>Caution: EEW Allowed with authorized Approver signature</td>
<td>NO EEW Allowed</td>
</tr>
<tr>
<td>No Tool/ equipment/ system redundancy and tool/ equipment/ system are considered a constraint to “factory” output. OR Powering down tools/ equipment/ systems would impact organization’s processing significantly and not be recoverable in less than 60 hours. OR Powering down tool/ equipment/ system would result in physical damage to tool/ equipment/ system.</td>
<td>Caution: EEW Allowed with authorized Approver signature</td>
<td>Caution: EEW Allowed with authorized Approver signature</td>
<td>Caution: EEW Allowed with authorized Approver signature</td>
</tr>
</tbody>
</table>

**NOTES:**

1) **UNDER NO CIRCUMSTANCES** shall the EEW be performed if the Employer feels the task cannot be performed safety.

2) "EEW Allowed with authorized Approver signature" sections above do not equate to automatic approval. Thorough investigation should be used to ensure no alternative method of providing service for affected systems exists.

3) Note that "tool" may refer to a FAB, SORT, LAB, Assembly Test, Computer Room, Data Center, or other business unit piece of equipment.
Appendix F - EEW Decision Process

**Requester**
1. Identifies Electrical Work scope
2. Field walks job with electrician contractor
3. Evaluates conditions to do work de-energized
4. Reviews EEW Matrix to determine if EEW Work may be performed
5. Discusses potential impacts with stakeholders
6. Obtains compelling reason from stakeholder
7. Verifies compelling reason meets requirements

**De-Energized Work**

- Perform Lockout/Tagout fill out pre-task plan and wear appropriate PPE

**Energized Work**

- Does electrical work need to be performed energized?
  - Yes
  - Contact System Owner to determine requirements and window to perform work
  - No

- Is electrical work for non permit required metering, testing and/or troubleshooting?
  - Yes
  - No

**Requester/Work Coordinator**
Submits EEW Permit & all documentation (e.g. panel schedule, one line diagram, signed EEW form by person claiming a compelling reason, tool schematic, etc.) to Authorized Intel Permit Approver for EEW permit signature

**Requester responsibilities**
- 1. Identifies Electrical Work scope
- 2. Field walks job with electrician contractor
- 3. Evaluates conditions to do work de-energized
- 4. Reviews EEW Matrix to determine if EEW Work may be performed
- 5. Discusses potential impacts with stakeholders
- 6. Obtains compelling reason from stakeholder
- 7. Verifies compelling reason meets requirements

**Approver responsibilities**
- Determines if the reason(s) to perform Energized Electrical Work (EEW) meets Intel's definition of Compelling Reason
- Yes
- No

**Authorized Permit Approver**

- Perform Lockout/Tagout fill out pre-task plan and wear appropriate PPE

**Permit Approver Signs**
and Permit is issued to Perform EEW per Corporate EHS Energized Electrical Work Standard
Appendix G – Considerations for Hand held Test Probe and Lead Selection

Test Probes:

1. Ensure the probes have finger barriers or are shaped to prevent access to live terminals and guard against inadvertent hand contact with conductors under test.
2. Tips of probes are insulated to minimize exposed metal and should not exceed 4mm/0.157in measured across any surface of the tip. Where possible it is advised to use spring loaded retractable screened probes.
3. Test probes should have self contained fault protection which should be provided with low current rating high breaking capacity fuses or current limiting resistor and fuse.

Test Leads:

1. Leads should be coloured such that one lead can be easily distinguished from the other.
2. The leads should be flexible and of sufficient capacity for the duty expected of them.
3. Leads should be robust and sheathed to protect against mechanical damage, insulated for the operating voltage.
4. Leads should not have exposed conductors other than the probe tips, nor have live conductors accessible to a person’s finger/body if a lead becomes detached from a probe when in use.
5. The test leads should fit firmly in the body of the test instrument and should be fully shrouded to prevent accidental contact in event of becoming separated from the instrument.
Appendix H – Alternative Arc Flash PPE Selection Matrix for 600V or Less

Per Section IV.D.3.C, where selected in lieu of the incident energy analysis, the following matrix may be used to determine the hazard/risk category. The assumed maximum short circuit current capacities and maximum fault clearing times for various tasks are listed in the notes of this Appendix. For tasks not listed or for power systems with greater than the assumed maximum short circuit current capacity, or with longer than the assumed maximum fault clearing times, arc flash calculations shall be performed per Section IV.D.3.

<table>
<thead>
<tr>
<th>Tasks Performed on Energized Equipment</th>
<th>Arc Flash PPE Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panelboards or Other Equipment Rated 240 V and Below — Note 1</td>
<td></td>
</tr>
<tr>
<td>Perform infrared thermographs and other non-contact inspections outside the restricted approach boundary</td>
<td>0</td>
</tr>
<tr>
<td>Circuit breaker (CB) or fused switch operation with covers on</td>
<td>0</td>
</tr>
<tr>
<td>CB or fused switch operation with covers off</td>
<td>0</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts, including voltage testing</td>
<td>1</td>
</tr>
<tr>
<td>Remove/install CBs or fused switches</td>
<td>1</td>
</tr>
<tr>
<td>Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts)</td>
<td>1</td>
</tr>
<tr>
<td>Opening hinged covers (to expose bare, energized electrical conductors and circuit parts)</td>
<td>0</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panel board or switchboard</td>
<td>1</td>
</tr>
<tr>
<td>Panelboards or Switchboards Rated &gt;240 V and up to 600 V (with molded case or insulated case circuit breakers) — Note 1</td>
<td></td>
</tr>
<tr>
<td>Perform infrared thermographs and other non-contact inspections outside the restricted approach boundary</td>
<td>1</td>
</tr>
<tr>
<td>Circuit breaker (CB) or fused switch operation with covers on</td>
<td>0</td>
</tr>
<tr>
<td>CB or fused switch operation with covers off</td>
<td>1</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts, including voltage testing</td>
<td>2*</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panel board</td>
<td>2*</td>
</tr>
<tr>
<td>600 V Class Motor Control Centers (MCCs) — Note 2 (except as indicated)</td>
<td></td>
</tr>
<tr>
<td>Perform infrared thermographs and other non-contact inspections outside the restricted approach boundary</td>
<td>1</td>
</tr>
<tr>
<td>CB or fused switch or starter operation with enclosure doors closed</td>
<td>0</td>
</tr>
<tr>
<td>Reading a panel meter while operating a meter switch</td>
<td>0</td>
</tr>
<tr>
<td>CB or fused switch or starter operation with enclosure doors open</td>
<td>1</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts, including voltage testing</td>
<td>2*</td>
</tr>
<tr>
<td>Work on control circuits with energized electrical conductors and circuit parts 120 V or below, exposed</td>
<td>0</td>
</tr>
<tr>
<td>Work on control circuits with energized electrical conductors and circuit parts &gt;120 V, exposed</td>
<td>2*</td>
</tr>
<tr>
<td>Insertion or removal of individual starter “buckets” from MCC — Note 3</td>
<td>4</td>
</tr>
<tr>
<td>Application of safety grounds, after voltage test</td>
<td>2*</td>
</tr>
<tr>
<td>Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts) — Note 3</td>
<td>4</td>
</tr>
<tr>
<td>Opening hinged covers (to expose bare, energized electrical conductors and circuit parts) — Note 3</td>
<td>1</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the motor control center</td>
<td>2*</td>
</tr>
<tr>
<td>600 V Class Switchgear (with power circuit breakers or fused switches) — Note 4</td>
<td></td>
</tr>
<tr>
<td>Perform infrared thermographs and other non-contact inspections outside the restricted approach boundary</td>
<td>2</td>
</tr>
<tr>
<td>CB or fused switch operation with enclosure doors closed</td>
<td>0</td>
</tr>
<tr>
<td>Reading a panel meter while operating a meter switch</td>
<td>0</td>
</tr>
<tr>
<td>CB or fused switch operation with enclosure doors open</td>
<td>1</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts, including voltage testing</td>
<td>2*</td>
</tr>
<tr>
<td>Work on control circuits with energized electrical conductors and circuit parts 120 V or below, exposed</td>
<td>0</td>
</tr>
<tr>
<td>Work on control circuits with energized electrical conductors and circuit parts &gt;120 V, exposed</td>
<td>2*</td>
</tr>
<tr>
<td>Insertion or removal (racking) of CBs from cubicles, doors open or closed</td>
<td>4</td>
</tr>
<tr>
<td>Application of safety grounds, after voltage test</td>
<td>2*</td>
</tr>
<tr>
<td>Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts)</td>
<td>4</td>
</tr>
<tr>
<td>Opening hinged covers (to expose bare, energized electrical conductors and circuit parts)</td>
<td>2</td>
</tr>
<tr>
<td>Other 600 V Class (277 V through 600 V, nominal) Equipment — Note 2</td>
<td></td>
</tr>
</tbody>
</table>

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## Electrical Safety

<table>
<thead>
<tr>
<th>Activity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting or small power transformers (600 V, maximum) - Removal of bolted covers (to expose bare, energized electrical conductors and circuit parts)</td>
<td>2*</td>
</tr>
<tr>
<td>Opening hinged covers (to expose bare, energized electrical conductors and circuit parts)</td>
<td>1</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts, including voltage testing</td>
<td>2*</td>
</tr>
<tr>
<td>Application of safety grounds, after voltage test</td>
<td>2*</td>
</tr>
<tr>
<td>Revenue meters (kW-hour, at primary voltage and current) Insertion or removal</td>
<td>2*</td>
</tr>
<tr>
<td>Cable trough or tray cover removal or installation</td>
<td>1</td>
</tr>
<tr>
<td>Miscellaneous equipment cover removal or installation</td>
<td>1</td>
</tr>
<tr>
<td>Work on energized electrical conductors and circuit parts, including voltage testing</td>
<td>2*</td>
</tr>
<tr>
<td>Application of safety grounds, after voltage test</td>
<td>2*</td>
</tr>
<tr>
<td>Insertion or removal of plug-in devices into or from bus ways</td>
<td>2*</td>
</tr>
</tbody>
</table>

**Notes:** The fault currents and upstream protective device clearing times below are based on an 18 in. working distance.

1. Maximum of 25 kA short circuit current available; maximum of 0.03 sec (2 cycle) fault clearing time.
2. Maximum of 65 kA short circuit current available; maximum of 0.03 sec (2 cycle) fault clearing time.
3. Maximum of 42 kA short circuit current available; maximum of 0.33 sec (20 cycle) fault clearing time.
4. Maximum of 35 kA short circuit current available; maximum of up to 0.5 sec (30 cycle) fault clearing time.
Appendix I – Site Specific Electrical Safety Requirements

<table>
<thead>
<tr>
<th>Site Location</th>
<th>Requirement Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ireland</td>
<td>Contact Ireland Site EHS to obtain a copy of additional local requirements.</td>
</tr>
<tr>
<td>Hudson/F17</td>
<td>Contact Fab 17 Site EHS to obtain a copy of additional local requirements.</td>
</tr>
</tbody>
</table>