



Global Services

EHS Policy / Procedure

Electrical Safety Policy

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GSSP-002

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Electrical Safety Policy

1. PURPOSE

It is always preferred to work on or around de-energized systems. However, many of the projects we are asked to complete require that we work around systems that remain energized. Since the electrical hazards cannot be eliminated, appropriate precautions and personal protective equipment need to be used.

2. SCOPE

This policy applies to all Vertiv Service Employees while at work at Company facilities or customer locations.

3. REFERENCE DOCUMENTS

Local Government Regulations

NFPA-70E

4. DEFINITIONS

- Arc Blast- An explosion resulting from an electrical fault resulting in a brilliant flash and the vaporization and dispersion of electrical conductors.
- Arc-flash hazard - A dangerous condition associated with the possible release of energy caused by an electric arc.
 - An electric arc occurs when current passes through the air. The result can be temperatures exceeding 35,000 °F and a blast.
- Arc rating - The maximum incident energy resistance demonstrated by a material (or a layered system of materials) prior to “breaking open” or at the onset of a second-degree skin burn. This rating is assigned to electrical protective clothing and is normally expressed in calories per square centimetre (cal/cm²).
 - Note: The Arc Rating of protective clothing is based on heat energy only. It does not take into account the blast (pressure, sound, etc.) energy that will coincide with the heat energy released.
- Arc Flash Risk Assessment - A study to investigate a worker’s potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, boundaries, and the appropriate levels of PPE required.
- Arc Flash Boundary - An approach limit at a distance from exposed live parts within which a person could receive a second-degree burn if an electrical arc flash were to occur.
 - This distance shall be where the incident energy is equal to or less than 1.2 cal/cm² (5J/cm²) or determined by the tables of NFPA-70E.
- Arc Flash suit - A complete FR clothing and equipment system that covers the entire body, except for the hands and feet. (Such a suit typically includes pants, jacket, and a “bee-keeper” style hood fitted with a face shield).
- AR apparel – Arc-resistant apparel; describes a broad category of clothing designed to protect employees from electrical arc events during completion of energized tasks.
- Incident energy - The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. One of the units used to measure incident energy is calories per square centimetre (cal/cm²).
- Limited approach boundary - An approach limit at a distance from an exposed live part within which a shock hazard exists.

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- Live parts - Energized conductive components.
- Qualified person - One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installation and has received training on the hazards involved. A qualified person could be qualified to work on one piece of equipment and not qualified to work on another as they have not demonstrated the skills and knowledge related to the construction and operation of the equipment
- Restricted approach boundary - An approach limit at a distance from an exposed live 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 live parts.
- Shock Hazard – A dangerous condition associated with the possible release of energy caused by contact or approach to energized electrical conductors or parts.
- Shock Hazard Risk Assessment – An assessment that determines the voltage to which personnel will be exposed, the shock protection boundaries, and the PPE necessary to minimize the possibility of an electric shock.
- Working near (live parts) - Any activity within a Limited Approach Boundary.
- Working on (live parts) - Any activity within a Restricted Approach Boundary via tools, probes, test equipment, hands, feet, or other body parts regardless of the level of PPE worn.
- NFPA 70E and/or IEEE 1584 – Recognized standards for arc flash protection procedures.

5. RESPONSIBILITIES

To ensure that this Electrical Safety Policy is implemented and maintained in accordance with the procedures listed in this policy, the following Vertiv personnel are given the following responsibilities.

5.1. Safety Manager

The Safety Manager has the responsibility for overseeing the Electrical Safety Policy which includes:

- Conducting an annual Electrical Safety Policy audit to determine effectiveness and compliance with the procedures established by this policy which includes noting deficiencies and/or observations of non-compliance and establishing corrective action plans to address noted items.
- Annually reviewing and updating this policy as necessary to reflect changes in OSHA, NFPA and/or Company requirements.
- Performing an initial safety inspection on all new and existing equipment, determining necessary PPE, guarding, and use of equipment.
- Developing and communicating Electrical Safety requirements.
- Scheduling and coordinating with Human Resources, the initial training and refresher training classes for all new employees and temporary workers prior to working.
- Ensuring that qualified personnel conduct the training classes and the content of the courses is in accordance with this policy.

5.2. Managers

Managers have the primary responsibility for the implementation of the Electrical Safety Policy within their areas of responsibility. Manager's responsibilities include:

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- Ensuring proper equipment is available, used correctly, inspected, and personnel are trained and/or qualified to use the equipment.
- Certify the qualification of their personnel
- Before use all equipment must be approved by the manager for use.
- Ensure that all defective equipment is taken out of service until repaired/replaced and safe to use.
- Initiating enforcement actions if warranted.
- Performing an annual audit on all Qualified Electrical Workers
- Informing contractors on the requirements of Electrical Safety Policy.

5.3. Employees

Employee is responsible for:

- Following requirements and instructions contained in this section.
- Not working on equipment that they are not qualified to work on.
- The skills and knowledge related to the construction, operation of the electrical equipment, installation and has received training on the hazards involved.
- Inspecting equipment prior to and after use.(inspecting equipment after use give you the ability to get the equipment repaired or replaced before needing it for the next job.)
- Use the proper equipment for the work being done.
- Tagging unsafe or defective equipment, removing from service, and notifying Management.
- Using equipment as directed in the manufacturer's/owner's safety manual unless an approved plan or procedure specifies using the equipment in a different way.
- Ensure that you have accounted for all company and personal tools, test and protective equipment before equipment is energized and before you leave the job site.

6. GENERAL PROCEDURES

6.1. Posted warnings

Employees shall read and comply with all posted warning signs and instructions.

- All electrical circuits shall be treated as Energized until they have been Locked Out, Tagged Out and verified de-energized with safety grounds applied as applicable (LOTO).
- All electrical conductors and equipment shall be listed or labelled by a Nationally Recognized Testing Laboratory (NRTL).
- All installation, operations, maintenance, and repair of any equipment should be in accordance manufacturer's literature and the instructions included in the listing or labelling. The instructions contained in this document are designed to supplement the manufacturer's literature, industry standards, experience, and knowledge. The instructions contained are not designed to be used by inexperienced personnel or address all possible situations, conditions, or hazards.
- Conductors and equipment shall be protected from over-current in accordance with their ability to safely conduct current.
- Following the operation of a circuit protective device, the circuit may not be manually re-energized until the equipment and circuit have been verified to be in a safe condition.

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- Cables and wires shall be spliced or joined with splicing devices suitable for intended use.
- No wiring system of any kind shall be installed in ducts used to transport dust, loose stock or flammable vapours.
- All splices, joints and free ends of a wire or cable shall be insulated.
- Sufficient workspace shall be provided and maintained around electrical equipment to permit safe operation and maintenance of equipment.
- Energized equipment shall be guarded.
- Ground wires must be identified and distinguishable from all other wires in Accordance with the National Electrical Code.
- Electrical control panels with open wires shall be guarded to make them accessible only to Qualified Persons.
- In addition to guarding, warning and high voltage signs shall be posted when unqualified personnel could come into contact with live parts.
- The area surrounding work areas is free of conductive equipment, parts or debris.
- Circuits shall be identified as to their use.
- Each service, feeder, and branch circuit, at its disconnecting means or over-current device, shall be legibly and durably marked to indicate its purpose, unless located and arranged so the purpose is evident.
- Each disconnect switch or over-current device required for a service, feeder, or branch circuit must be clearly labelled to indicate the circuit's function, and the label or marking should be located at the point where the circuit originates.

6.2. Inspection and evaluation the electrical equipment

- All electrical equipment and cords shall be inspected prior to each use. The inspection shall include but is not limited to the following:
 - Physical integrity of enclosures and cabling insulation.
 - Insulation of portable test equipment and tool cords and casings.
 - Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected and shall be suitable for the environment in which they will be used.
 - Test equipment calibration is within periodicity (normally annually) where required.
 - Any material not meeting the above criteria shall be immediately reported to the employee's manager and removed from service until repairs are made.
- Energized parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by approved cabinets or other forms of approved enclosures, or by any of the following means:
 - By location in a room, vault, or similar enclosure that is accessible only to Qualified Persons.
 - By suitable permanent, substantial partitions or screens so arranged that only Qualified Persons would have access to the space within reach of the energized parts. Any openings in such partitions or screens shall be so sized and located that persons are not likely to come into accidental contact with the energized parts or to bring conducting objects into contact with them.
 - By location on a suitable balcony, gallery, or platform.

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- By elevation of eight feet (2.4 meters) or more above the floor or other working surface. Note that, although equipment elevated at least eight feet is considered to be guarded, this may not be adequate if material being handled is likely to make contact with energized parts.
- Entrances to rooms and other guarded locations containing exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter.

Additionally, all maintenance employees shall conduct a physical integrity and grounding system visual inspection anytime a piece of equipment is opened for servicing.

7. Job planning, briefing and documentation

All energized electrical work at the facility shall be planned and first-time procedures shall be documented and retained by the manager responsible for the work for future reference. Hazard analysis for job planning shall be conducted using the guidance contained in Vertiv Procedures and NFPA 70 E.

- The job plan shall contain the following minimum elements:
 - Purpose of task
 - Qualifications and number of employees to be involved
 - Hazardous nature and extent of task
 - Limits of approach
 - Safe work practices to be utilized
 - Personal protective equipment involved
 - Insulating materials and electrically rated tools involved
 - Special precautionary techniques
 - Electrical diagrams, equipment details, sketches/pictures of unique features, and any reference data to be used.

7.1. Job briefings

Before starting each job, the employee in charge shall conduct a job briefing with the employees involved. The briefing shall cover such subjects as hazards associated with the job, work procedures involved, special precautions, energy source controls, PPE requirements, and the information on the energized electrical work permit, if required. Additional job briefings shall be held if changes that might affect the safety of employees occur during the course of the work.

- The person responsible for the work shall brief all jobs with the affected employees and supervisors.
- Customer and subcontractor representatives shall be included in all job briefings
- An affected employee is one whose job requires him/her to operate or use a machine or equipment, or whose job requires him/her to work in an area, on which servicing or maintenance is being performed.
- In addition to the above requirements, supervisors shall ensure that all job plans and briefs attempt to anticipate unexpected events and identify and minimize all possible hazards.
- Additional hazard analyses and job briefs will be conducted if there are changes to job scopes or site conditions.
- Where a task will be repeated throughout the day, only one briefing is required to be performed prior to the commencement of work.

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- Job plans and briefs shall be used as a tool to eliminate or control hazards associated with the work.

8. Energized Work – **Bare Hand work on any voltage is Strictly Prohibited**

- Normally all live parts (> 50 volts) which an employee may come into contact with shall be put into an electrically safe condition utilizing the Lock-Out / Tag-Out (LOTO) procedure.
- Personnel shall not work on energized circuits unless they are qualified to do so, or, for training purposes, unless they work under the direct supervision of a qualified person.
- Personnel shall not make cable connections to energized components connections unless connectors are specifically listed for that purpose and approved by the job lead.
- All electrical conductors shall be considered live until placed in an electrically safe condition and verified via the LOTO procedure.
- No work is ever to be conducted on exposed energized electrical conductors or circuit parts above 50 volts without Electrical Rubber Insulated Gloves and Leather Protectors.
- Work on energized electrical conductors or circuits less than 50 volts requires the use of gloves based on the hazard(s) identified.
- Performing checks to verify that equipment is deenergized shall be considered Energized Work for the purpose of this instruction.
- **Only when it can be demonstrated that deenergizing the equipment will introduce additional or increased hazards, or is infeasible due equipment design or operational limitations, will energized work be authorized by the Local Manager or their designated representatives**, (e.g. quantitative or qualitative electrical diagnostic measurements or routine adjustments).
- Authorization for energized work shall be obtained utilizing an Energized Electrical Work Permit Form.
- Authorization for switching customer equipment shall be obtained utilizing a Switching Authorization Form.
- The signers of the document will retain a copy of the authorization forms referenced above.
- Routine testing, voltage measurements, and troubleshooting by qualified employees may be conducted without the use of an energized work permit **as long as the safe work procedures and required PPE of this document are utilized.**

8.1. Examples of work not requiring an energized work permit

- Opening a hinged cover on an enclosure to perform a visual inspection
- Performing voltage measurements to verify a zero energy state
- Connecting an I/O device to a PLC or Variable Frequency Drive.
- Infrared scanning performed outside the Restricted Approach Boundary
- Other frequently performed tasks which local site management has approved.
- Business Unit Managers or their designated representatives shall approve all Energized Work Permits.

8.2. Personnel precautions for performing energized work

- No personnel shall perform energized work when alertness may be impaired due to illness, fatigue or other reasons.
- Personnel shall not reach blindly into energized areas.

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- Personnel shall not perform energized work where the view is obstructed or adequate illumination does not exist.
- Personnel shall verify that they are not wearing conductive articles, clothing or jewellery prior to working on energized electrical equipment.
- Personnel shall only wear clothing made from natural fibres when performing energized work.
- Personnel shall not bring any non-electrically rated tools or equipment into the work area (this includes ladders and stools).
- Electrical Safety procedures, tools, and PPE are also required for employees and contractors who test or service Vertiv and/or other manufactured equipment/products while energized including during the manufacturing process.

8.3. Ground Fault Protection

- All portable power tools and cords shall be protected by GFCI devices.
- Exceptions to the GFCI requirement may be made when test equipment has its own internal ground fault protection or on construction sites where an Assured Grounding Program has been implemented.
- If energized work is to be accomplished in the vicinity of potentials in excess of 600 volts or the work is deemed particularly hazardous, a safety observer shall be assigned. The safety observer shall monitor the area for unsafe conditions, provide warnings when these conditions exist and shall be briefed on equipment cut-outs and electrical emergency procedures. The safety observer will be qualified in CPR and have no other duties.

9. Selection of Tools

- Only voltage rated tools and insulated equipment shall be used inside of the Restricted Approach Boundary.
- Voltage rated tools shall be designed and constructed for the environment to which they are exposed and the manner in which they are used.
- Fuse or fuse holder handling equipment insulated for the circuit voltage, shall be used to remove or install a fuse if the fuse terminals are energized.
- Voltage rated tools shall be protected from damage and degradation of the integrity of the insulation and not modified from their original design in any way (e.g.; replacing insulation with tape, etc.).
- Rubber insulating equipment must be stored in an area protected from light, temperature extremes, excessive humidity, ozone, and other substances and conditions that may cause damage.
- Voltage rated gloves shall not be stored inside leather protector gloves to prevent degradation of the rubber.
- Insulating equipment found to have defects that might affect its insulating properties must be removed from service until testing indicates that it is acceptable for continued use.
- Ropes and hand lines used near exposed energized parts must be nonconductive.
- Portable ladders used for electrical work must be nonconductive (including side and hand rails).

10. Selection and Use of Personal Protective Equipment (PPE)

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- Personnel will be insulated from exposed energized parts anytime they are within the Restricted Approach boundary. Personnel will establish a boundary at either the Limited Approach Boundary or the Arc Flash Boundary (whichever is the greater distance) to minimize the risk to unprotected persons (See tables below for shock protection boundaries)

Shock Protection Boundaries AC Systems			
Nominal System Voltage Phase to Phase	Limited Approach Boundary		Restricted Approach Boundary
	Exposed Movable Conductor	Exposed Fixed Conductor	
<50 V	Not Specified	Not Specified	Not Specified
50 - 150 V	3.0 m (10 ft. 0 in.)	1.0 m (3 ft. 6 in.)	Avoid contact
151 - 750 V	3.0 m (10 ft. 0 in.)	1.0 m (3 ft. 6 in.)	0.3 m (1 ft. 0 in.)
751 V - 15 kV	3.0 m (10 ft. 0 in.)	1.5 m (5 ft. 0 in.)	0.7 m (2 ft. 2 in.)
15.1 - 36 kV	3.0 m (10 ft. 0 in.)	1.8 m (6 ft. 0 in.)	0.8 m (2 ft. 7 in.)
36.1 - 46 kV	3.0 m (10 ft. 0 in.)	2.5 m (8 ft. 0 in.)	0.8 m (2 ft. 9 in.)
46.1 - 72.5 kV	3.0 m (10 ft. 0 in.)	2.5 m (8 ft. 0 in.)	1.0 m (3 ft. 3 in.)
72.6 - 121 kV	3.3 m (10 ft. 8 in.)	2.5 m (8 ft. 0 in.)	1.0 m (3 ft. 4 in.)
138 - 145 kV	3.4 m (11 ft. 0 in.)	3.0 m (10 ft. 0 in.)	1.2 m (3 ft. 10 in.)
161 - 169 kV	3.6 m (11 ft. 8 in.)	3.6 m (11 ft. 8 in.)	1.3 m (4 ft. 3 in.)
230 - 242 kV	4.0 m (13 ft. 0 in.)	4.0 m (13 ft. 0 in.)	1.7 m (5 ft. 8 in.)
345 - 362kV	4.7 m (15 ft. 4 in.)	4.7 m (15 ft. 4 in.)	2.8 m (9 ft. 2 in.)
500 - 550 kV	5.8 m (19 ft. 0 in.)	5.8 m (19 ft. 0 in.)	3.6 m (11 ft. 10 in.)
765 - 800 kV	7.2 m (23 ft. 9 in.)	7.2 m (23 ft. 9 in.)	4.9 m (15 ft. 11 in.)

Shock Protection Boundaries DC Systems

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Nominal Potential Difference	Limited Approach Boundary		Restricted Approach Boundary
	Exposed Movable Conductor	Exposed Fixed Conductor	
<100 V	Not Specified	Not Specified	Not Specified
100 - 300 V	3.0 m (10 ft. 0 in.)	1.0 m (3 ft. 6 in.)	Avoid contact
301 V - 1 kV	3.0 m (10 ft. 0 in.)	1.0 m (3 ft. 6 in.)	0.3 m (1 ft. 0 in.)
1.1 - 5 kV	3.0 m (10 ft. 0 in.)	1.5 m (5 ft. 0 in.)	0.5 m (1 ft. 5 in.)
5 - 15 kV	3.0 m (10 ft. 0 in.)	1.5 m (5 ft. 0 in.)	0.7 m (2 ft. 2 in.)
15.1 - 45 kV	3.0 m (10 ft. 0 in.)	2.5 m (8 ft. 0 in.)	0.8 m (2 ft. 9 in.)
45.1 - 75 kV	3.0 m (10 ft. 0 in.)	2.5 m (8 ft. 0 in.)	1.0 m (3 ft. 2 in.)
75.1 - 150 kV	3.3 m (10 ft. 8 in.)	3.0 m (10 ft. 0 in.)	1.2 m (4 ft. 0 in.)
150.1 - 250 kV	3.6 m (11 ft. 0 in.)	3.6 m (11 ft. 8 in.)	1.6 m (5 ft. 3 in.)
250.1 - 500 kV	6.0 m (20 ft. 0 in.)	6.0 m (20 ft. 0 in.)	3.5 m (11 ft. 6 in.)
500.1 - 800 kV	8.0 m (26 ft. 0 in.)	8.0 m (26 ft. 0 in.)	5.0 m (16 ft. 5 in.)

- Insulating material for the prevention of electrical shock will be selected based on the highest line voltage that will be exposed during the performance of the work (see Table below).

Class	AC Maximum Use Voltage
0	1000
1	7,500
2	17,000
3	26,500
4	36,000

- Insulating equipment made of materials other than rubber shall be rated to provide electrical and mechanical protection at least equal to that of rubber equipment.
- PPE will be maintained in a safe, reliable condition and shall be inspected before and after each use and electrically tested in accordance with Vertiv Standards or Government standards if more restrictive (see table below). The equipment shall be replaced if the insulating capability of the protective equipment is decreased due to damage during use. Before each use, the insulating equipment will be visually inspected and again immediately following any incident where the equipment may have been damaged. Visual inspections will consist of examining for holes, tears, punctures or cuts; ozone checking; embedded foreign objects; textural defects such as swelling, softening, hardening or stickiness; any other defect that results degradation of the insulating quality.
- Rubber insulating gloves will be inflated with air and then sealing off the cuff area or rolling up the sealed cuff. The glove shall stay inflated with no leakage.
- Leather protective gloves will be worn over rubber insulating gloves for all work.

Rubber Insulating Equipment Testing Intervals	
Type of Equipment	Electrical Testing Frequency

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Rubber Insulating Gloves	Before first issue and every 6 months thereafter.
Rubber Insulating Blankets and Floor Mats	Before first issue and every 12 months thereafter.
Rubber Insulating Sleeves	Before first issue and every 12 months thereafter.
Insulating poles. i.e. Hot sticks, shepherd's hooks, shotgun sticks, discharge poles, etc.	Every 2 years.

(Note: If any insulating equipment has been electrically tested but not placed in service, it may not be placed into service unless it has been electrically tested within the previous 12 months. Employees are responsible for ensuring the above requirements are met prior to use.)

10.1. Personnel exposure to Arc Flash Hazards

- Employees must wear protective equipment whenever there is a potential danger of electric arcs or flashes or from flying materials resulting from an arc blast. This shall include Arc Rated protection for the head, neck, face, hands and the over the arms and torso and legs. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces, shall be practiced. Employees must also establish arc flash boundaries and not allow any unprotected persons to cross that boundary.
- The preferred method of selecting PPE and establishing Arc Flash Boundary would be to follow labelling on the equipment developed from an engineering study (see example label below).



- However, if the equipment is not labelled or the reliability of the study used to develop the label is in doubt the below tables will be used to establish the minimum PPE and boundary distances.

Vertiv Required Arc Flash Protection PPE Levels and Boundaries		
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Note: These tables must be used when arc-flash incident energy <i>has not</i> been calculated (e.g.; no Arc Flash Study is available)		
Arc Flash PPE levels for AC Systems		
Equipment	Arc-Flash PPE Level	Arc-Flash Boundary
Panel Boards or other equipment rated at 50 -600 V.	2	1.5 m (5 ft.)
600 V or above motor control centres	4	4.3 m (14 ft.)
600 V or above switchgear	4	6.0 m (20 ft.)
Arc Flash PPE levels for DC Systems		
Equipment	Arc-Flash PPE Level	Arc-Flash Boundary
Batteries, Switchboards, or other DC supplies rated at 50 - 250 V	2	1.2 m (4 ft.)
Batteries, Switchboards, or other DC supplies rated at 250 V - 600V	4	2.5 m (8 ft.)

10.2. Vertiv Policy on incident energy levels exceeding 40 cal/cm²

Vertiv policy does not permit employees to be exposed to an incident energy exceeding 40 cal/cm². At those levels, no safe PPE exists for service personnel to wear while servicing the equipment when the equipment is energized and has its panels removed or its doors opened. This restriction applies for Vertiv employees or any other individual that may service or open equipment.

These safety restrictions are defined in NFPA 70E Standard. The highest PPE available to Vertiv employees is rated 40 cal/cm² arc (PPE Level: 4)

NFPA 70E does not advise of any PPE that will protect individuals from an arc flash event with incident energy over 40 cal/cm². The Arc Flash Rated PPE protects individuals from thermal energy, but does not protect the individual from the pressure wave from the arcing fault. The explosive effect of some arc events, especially those exceeding 40 cal/cm², could cause serious physical trauma.

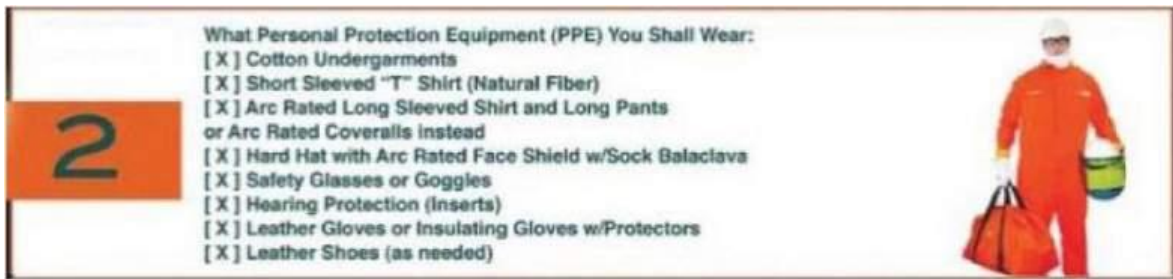
10.3. Vertiv Provided Arc Flash PPE

Level 2: A minimum of level 2 Protection shall be worn when exposed to Arc Flash incident energy between 1.2 and 8 cal/cm² or when using the task table (reference) for level 2 activities. **All arc rated clothing/PPE (uniforms and coveralls must be made with Westex fabric. Purchase of new Arc Flash Rated Clothing must be Westex Fabric.**

Arc Rated Clothing, Minimum Arc Rating of 8 cal/cm²:

- Arc-rated long-sleeve shirt and pants or arc-rated coverall.
- Arc-rated flash suit hood or arc rated face shield (10 cal/cm² minimum) and balaclava
- Arc-rated outer wear as necessary (cold weather gear, rain gear, etc.)
- Non Conductive Safety glasses with side shields or goggles
- Hard Hat – Class E
- Hearing protection (Minimum NRR 25 dB)
- Leather protective gloves (over rubber electrical gloves)
- Electrical Rated Rubber Gloves
- Leather safety footwear
- Electrical Rubber Insulated Sleeves – if required

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Level 4: A minimum of level 4 Protection when using the task table (reference) for level 4 activities. Where an arc flash study has been completed, and the incident energy is greater than 8 cal/cm², employees shall be protected at level that meets or exceeds the incident energy study.

Arc Rated Clothing, Minimum Arc Rating of 40 cal/cm².

Arc-rated flash suit jacket

Arc-rated flash suit pants

Arc-rated flash suit hood

Non Conductive Safety glasses with side shields or goggles

Hard Hat Class – E

Hearing protection (ear canal inserts must be ANSI approved) (Minimum NRR 25 dB)

Leather protective gloves (over rubber electrical gloves)

Electrical Rated Rubber Gloves

Leather safety footwear

Electrical Rubber Insulated Sleeves – if required



Qualified employees will use the Arc Flash PPE required by the incident energy study or by using the appropriate Vertiv Levels of protection.

11. Training and Qualification

All employees shall be trained in the electrical hazards associated with their specific work environments.

11.1. Qualified Employees

In order for an employee to be considered qualified, he / she shall have been an employee at the site for at least 90 days, received instructor led and/or On the Job training (OJT) and have demonstrated to their manager that they have the knowledge and skill to work safely around energized conductors. This must be documented utilizing the approved form. As a minimum the training will include the topics listed below.

- Identification of live parts.
- Determination of nominal voltages.

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- Determination and significance of approach distances.
- Hazard identification, mitigation and PPE required.
- Proper inspection and use of portable test equipment including calibration and grounding.
- Safely de-energizing of parts and subsequent electrical lockout and tagging procedures as required by the LOTO policy.
- Proper precautionary work techniques.
- Proper use of personal protective equipment to include non-conductive gloves, aprons, head protection, safety glasses and face shields.
- Proper selection and use of rated test instruments and equipment including the capability to visually inspect all parts of the test equipment for defects.
- Use of insulating and shielding materials for employee protection to include auxiliary shields, guards, mats, or other specific equipment.
- Proper use of insulated tools or other non-conductive devices such as fuse pullers, fish tapes, hot sticks, ropes or hand lines.
- The importance of illumination and to work only in properly illuminated areas.
- Proper work techniques for work in enclosed or confined workspaces.
- Removal or special handling of any conductive materials and equipment.
- Proper and safe use of portable ladders around electrical equipment.
- Removal of any conductive apparel or jewellery.
- Proper alerting techniques such as safety signs and tags, barricades, attendants, and work practices
- Emergency procedures including release of victims from contact with energized conductors, first aid and approved methods of resuscitation.
- Any other safety related work practice not listed above but is necessary for them to safely do their job.
- Refresher training on the above topics shall be conducted annually.
- The Direct Manger shall perform a direct observation of the employee's ability to perform the above skills and maintain a list of qualified employees including any limitations placed on the specific employee (voltage class, type of equipment, etc.).
- The Direct Manager shall conduct and document annual reviews of the training and safety performance of these personnel.

11.2. Emergency Response Training

- Employees shall be trained in first aid and emergency procedures.
- Employees shall be trained in cardiopulmonary resuscitation (CPR). Refresher training shall occur at minimum bi-annually. Employees shall be trained in the use of an automated external defibrillator (AED) if an employer's emergency response plan includes the use of this device. Refresher training shall occur at minimum bi-annually.

12. Contractors

Outside contractors that will be performing work on site shall follow at a minimum, this Electrical Safety Policy and be pre-qualified to perform electrical work.

- Vertiv and the outside Contracting firm must inform each other of their respective Electrical Safety procedures. The responsibility of training outside contractor's employees lies with their employer.

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13. Test Equipment (this section for ERS and HVM or others if needed)