

ENERGIZER SINGAPORE PTE LTD (ENSIL)

Singapore Facility House Rules



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I. Facility Safety Information

A. Fires and emergencies

1. Must be reported
2. Contact Security immediately at: **Ext. 264**

B. Emergency Alarms

1. Normal Working Hours

a) ROUTINE TESTING - DO NOT EVACUATE THE BUILDING.

Our emergency routine testing alarm is a short ringing of the alarm bell. This carried out every Friday from 3:30 pm.

b) EVACUATION ALARM (continuous sounding of the alarm bell) - EVACUATE THE BUILDING

Our evacuation alarm is a continuous sounding of the alarm bell. If you hear this, leave the building through the nearest exit and assemble at the designated assembly point. All exits are marked with lighted signs. If the electricity fails, exits are lighted by emergency power.

c) All Clear Signal (Announcement)

When it is safe to return to the building or to stop being on alert (stand down), an “all clear” is passed along verbally by the area coordinator and also announced through the Public Address (PA) System.

2. After Hours

Those contract employees, working extended hours must:
Be accompanied by an ENSIL personnel.

a) EVACUATION ALARM - EVACUATE THE BUILDING

All emergencies will be considered a fire alarm event and you will be expected to evacuate. If you hear the alarm, leave the building through the nearest exit and proceed to the assembly point. All exits are marked with lighted signs. Re-enter the building only after permission is given to return by ENSIL shift supervisor.

C. Injuries and Illnesses

(Ref: CSCP “Accidents and First Aid”)

1. Contractors/Contractor’s Employee(s) must report work related injuries and illnesses, unsafe conditions, and near misses, immediately to their ECR (Energizer Contractor Representative).
2. In the event of serious injury requiring immediate medical attention, contact Security at ext. 264. The facility medical emergency response team can be summoned in addition to local paramedics.
3. Universal Precautions shall be observed by all contractors to prevent the contact with blood or other potentially infectious materials.

D. Safety and Health Rules

1. Failure to comply with safety and health rules can lead to disciplinary action up to and including termination of contract.

II. General Policy

A. Parking

1. The parking lot in front of the Administration building is reserved for visitors.
2. Contractors should park company vehicles (i.e. service trucks) in the spaces located. If parking is unavailable at this location, permission to park elsewhere must be obtained from the ECR. The Contractor and his employees must park their automobiles in reverse.
3. All plant vehicles may be operated only by ENSIL employees who have been trained and have been authorized to do so by their Supervisor.

B Security badges

1. Must be worn and displayed at all times so they can be seen readily.
2. ENSIL will issue Facility badges to Contractor employees and Subcontractor employees. Badges must be appropriately worn at all times while on company property.

C. Working hours

1. ENSIL and the Contractor must agree on the Contractor's regular working hours.
2. ENSIL must know and approve of overtime work on weekends and second shift.
3. A separate list of employees working outside of regular hours must be submitted if requested by ENSIL and/or if personnel differ from those already submitted by the Contractor.

D. Storage of equipment and materials

1. ENSIL may provide areas for storing material and equipment. Each Contractor and Subcontractor must protect his/her own materials, equipment, tools, etc. from theft and vandalism if allowed to be stored on site.
 - a) The Contractor must cover and protect the facility, and everything located on the construction site or staging area that will be built into the facility, from weather and other damage.
 - b) The ENSIL designated engineer must agree with the way the Contractor covers and protects these items.
 - c) The Contractor also must provide proper security for those items when ENSIL does not.

E. No Smoking

(Ref: CSCP “Smoking and Open Flames”; Plant Safety Instructions S031 “Safety & Health Rules”)

1. Smoking in any part of the plant is not permitted except at the designated smoking area.
2. Smoking in vehicle is also not permitted.

F. No Alcoholic Beverages or illegal drugs

(Ref: CSCP “Substance Abuse Screening and Background Check”)

1. Any Contractor employee taking medication that affects reaction and judgment or causes drowsiness should advise his or her supervisor.

G. Rules of Conduct

(Ref: CSCP “Rules of Conduct”)

1. No running
 - a) It is also important to stay in designated walkways in the facility. Do not take short cuts or go through restricted areas (offices, laboratories, etc.) to save time. Walk at all times.
2. Obey all warning and safety signs.
 - a) Safety signs are posted only when a hazard exists. Any Contractor or Contractor’s Employee who has questions about the hazard should contact his/her ENSIL representative.
3. No eating or drinking or food preparation in restricted areas.
 - a) Snacks and beverages may be consumed in areas of the facility where the potential for contamination or other safety and health rules do not prohibit it.
 - b) Permanently restricted areas are posted.
 - c) Use good judgment in other areas. If in doubt, consult your ENSIL representative.
 - d) Food or beverage preparation is prohibited except in the cafeteria area.
 - e) Wash your hands before eating, drinking or smoking.
4. Horseplay is never permitted.
5. Report any unsafe condition or practice to your Supervisor.
6. Avoid wearing loose clothing, rings or loose jewelry around equipment. When working around moving machinery, long hair must be tied securely or contained in a hair net or cap or worn up to prevent being caught in the equipment or machinery.
7. Never use compressed air to blow dust off your clothing.
8. Aluminum / metal stepladders are prohibited.

H. Contractors entrance

1. Contractors must enter the facility through the main entrance where the guardhouse is located.
2. The contractor/contractor’s employee(s) will sign a log book and will receive a Contractor’s Badge after completing the sign-in.

3. Your Contractor badge must be worn at all times while in the facility and should be located on the individual so that it is readily visible.
4. The Visitor's Entrance (lobby) to the Administration Building is to be used for business purposes only.
5. Contractors should bring materials into the facility through the Receiving area **ONLY** and not through the lobby.

III. Facility Services

A. Sprinklers, hydrants, or fire fighting systems should be cut off only when absolutely necessary.

1. The Contractor must coordinate cut-offs with ENSIL well in advance so that ENSIL's insurance company and local fire department (SCDF) can be alerted.

B. The Contractor is not permitted to **dispose of any waste** in ENSIL's storm or sanitary sewer systems.

C. The Contractor must store **flammable liquids** in an approved container at a safe distance from buildings, must identify contents, and obtain approval from the ENSIL Environmental Coordinator.

1. **Liquid storage** areas must be diked or otherwise confined, to control leaks or accidental spills.

D. No operation of **gasoline or diesel engines** is permitted in ENSIL occupied areas without specific written approval. Propane forklifts may be used only in areas approved by ENSIL.

IV. Work in ENSIL occupied areas

A. Absolutely **no overhead work** is permitted in ENSIL occupied areas over ENSIL employees.

1. With prior ENSIL approval, the Contractor should schedule this work on weekends, holidays, or other non-production periods.
2. Areas under the work must be barricaded.

B. The Contractor must not block **emergency exits or aisle ways** leading to emergency exits.

1. Fire lanes and access to fire-fighting equipment must be kept clear.

V. Roof Access safety policy

A. The **roof access safety policy** is to be used as a guideline for outside contractors working on the roof or other remote locations of the building.

B. Certain rules specifically designed for roof purposes do not necessarily apply to all other remote areas since each area contains various conditions that are unique to that area itself.

C. Good judgment and common sense become key factors in providing a safe working environment.

1. Even though there may be certain minor exception to the policy outlined below, strict adherence to all applicable rules is mandatory.

D. Each person working on the roof shall know the locations of:

1. Nearest telephone
2. Area light switches
3. Nearest fire extinguishers

E. When working on the roof:

1. Employees and contractors who perform work on equipment or repairs to the building on the roof area **must work in pairs**. They must **notify Energizer personnel (from lithium or Facility)** in what area of the roof they will be working, and how long they will be in the area.
 - a) However, in instances where maintenance personnel are only entering the roof to observe or check an item, but will not perform maintenance or repair, they do not have to be accompanied by a second person (i.e. reset a circuit breaker or walk through the main roof corridor for observation of the area).
 - b) The rule requiring notification of Lithium or Facility personnel before entering the area must still be followed. The individual is also responsible for notifying the Lithium or Facility personnel when he/she leaves the roof. If these conditions are not met, Lithium or Facility personnel will notify the supervisor in charge of maintenance to check the roof area for the individual.

VI. Contractor Specific Rules

(Ref: CSCP Contractor Safety Compliance Program)

A. Work related to various industrial trades

1. Any work performed that is required to follow local standards, common good accepted industry practices and ENSIL safety guidelines must be practiced by the contractor.
2. Examples: electrical worker; one who performs service/troubleshooting, wiring, etc. internal to the electrical panel or wire-way must comply with local and ENSIL requirements for Electrical Workers. Other examples of trades people are Welders, Roofers, Painters, HVAC, System installers, Movers, etc.

B. All Contractors are required to:

1. Review ENSIL Contractor Safety Compliance Program
2. Review, understand and sign a Confidential Agreement
3. Submit Proof of Proper Insurance

C. Personal Protective Equipment

1. Must be supplied by contractor.

2. Safety glasses with side shields are required in all laboratories, production floor, the machine shop, utility rooms, areas under construction in and on other ENSIL safety glasses designated property.
3. Ear plugs or muffs are required in areas where noise from equipment or surroundings exceeds 85 dbA. Areas where hearing protection is required are marked. If the noise generated by the contractor's equipment causes the noise level in an area to exceed 85 dbA, hearing protection in that area is required.

D. Eyewash station and safety shower

1. Know the location of the nearest eyewash station and safety shower in the area.
2. In the event of a chemical splash, flush eyes or body part for at least fifteen (15) minutes, then seek medical attention.

E. Equipment and tool safety

1. It is the responsibility of the contractor/contractor's employee(s) to ensure that safety devices, on equipment and tools to be used that day, are working properly.
2. All portable hand tools and portable electrical tools such as drill motors, hand grinders, saws, extension cords, etc., are to be visually inspected by the user to assure that the tool is safe to use.
3. No pen knife with long breakable blade is allowed. Only retractable safety cutter is to be used.
4. "Lock-on" buttons are prohibited to be used on power tools.

F. Operating unguarded equipment with safety devices bypassed

- 1. DO NOT OPERATE EQUIPMENT WITHOUT GUARDS IN PLACE OR WITH SAFETY DEVICES BYPASSED.**
2. If it is necessary to operate unguarded, energized equipment, with safety devices bypassed or inoperable, written authorization in the form of a "HAZARDOUS WORK PERMIT" must be obtained from and approved by ENSIL management.

G. Work on moving or energizer equipment (machinery)

1. Work on ENSIL equipment (machinery) that is moving or energized is STRICTLY PROHIBITED.
2. Work on a piece of equipment or machinery can only be performed after all energy sources on that machine have been de-energized and locked and tagged using the 'Lockout/Tagout' procedures for that piece of equipment.

H. Working on 'De-Energized' Equipment (machinery)

1. (Ref: CSCP "Lockout / Tagout" and any other specific Safety Rules)

2. When working on ‘De-Energized’ equipment where stored energy in the form of air/water pressure, hydraulic, spring loaded, kinetic (such as fly wheels) electrical or radiation can cause an unexpected energy release Lockout / Tagout Procedures are required.
3. If LOCKOUT/TAGOUT is required during work, Energizer requires that lock and tag be applied by each individual person working on the equipment. **We do not permit tags only or locking and tagging out by contractor supervisor on behalf of his/her subordinates.**

I. Electrical Hazards

1. General Personal Requirements:
 - a) **Alertness:** Employees shall be instructed to be alert at all times when they are working near live parts within the Limited Approach Boundary of energized electrical conductors or circuit parts or where other electrical hazards exist. Employees are not permitted to work within the Limited Approach Boundary on energized electrical conductors or circuit parts or where other electrical hazards exist while their alertness is recognizably impaired due to illness, fatigue, or other reasons.
 - b) **Blind Reaching:** Employees shall be instructed not to reach blindly into areas that might contain live parts.
 - c) **Conductive Articles Being Worn:** Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or unrestrained metal frame glasses) shall not be worn where they present an electrical contact hazard with energized electrical conductors and circuit parts, unless such articles are rendered nonconductive by covering, wrapping, or other insulating means.
 - d) **Clothing Not Permitted:** Clothing made from flammable synthetic materials that melt at temperatures below 315°C (690°F) such as acetate, acrylic, nylon, polyester, polyethylene, polypropylene, and spandex, either alone or in blends shall not be used.
 - e) **Emergency Procedures:** Employees shall be trained in methods of release of victims from contact with exposed energized conductors or circuit parts and regularly instructed in methods of first aid and emergency procedures such as CPR.
 - f) **Eye Protection:** Employees shall wear protective equipment for the eyes to prevent injury from electric arcs, flashes, or from flying objects resulting from an electrical explosion.
 - g) **Face Protection:** Employees shall always wear eye protection under face shields or hoods.
 - h) **Foot Protection:** Employees shall wear electrical hazard or EH rated shoes. They shall maintain this footwear clean and free of any known defects.
 - i) **Housekeeping:** Employees shall maintain all tools and clothing in a clean and dirt free manner.
2. General Work Requirements:

- a) **Attendants:** If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees. An attendant shall remain in the area as long as there is a potential for employees to be exposed to the electrical hazards.
- b) **Barricades:** 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 or potential energized conductors or circuit parts. Conductive barricades shall not be used where it might cause an electrical hazard. The barricades shall be placed no closer than the Limited Approach Boundary.
- c) **Blind Reaching:** Employees shall be instructed not to reach blindly into areas that might contain exposed electrical conductors and circuit parts or potential energized electrical conductors or circuit parts where an electrical hazard exists.
- d) **Conductive Cleaning Materials:** Employees shall not use steel wool, metalized cloth, silicon carbide, water, aerosol cleaning fluids, or other electrically conductive cleaning materials inside the Limited Approach Boundary.
- e) **Conductive Materials:** Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in a manner that prevents accidental contact with energized electrical conductors or circuit parts. Such materials and equipment include, but are not limited to; long conductive objects such as ducts, pipes, tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members and chains.
- f) **Electrical Clearances:** Always assure that proper depth of working space is maintained and present when conducting voltage or amperage measurements on energized conductors or circuit parts.
- g) **Hazardous Classified Locations:** Electrical maintenance conducted in Hazardous or Classified Locations must always ensure that the form of construction, installation, and other maintenance activities being conducted on the equipment uses materials that are suitable for the Hazardous or Classified Location and that the classification is not compromised. All electrical troubleshooting conducted in Hazardous or Classified locations must always adhere to the pertinent JSHA and the procedures required for the area to ensure that the electrical activity does not introduce any additional hazards in itself.
- h) **Illumination:** Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely. Where there is a lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any tasks within the Limited Approach Boundary of energized conductors or circuit parts where an electrical hazard exists.
- i) **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 to recognize and avoid the hazards involved.
- j) **Portable Ladders:** Portable ladders shall have nonconductive side rails if they are used where the employee or the ladder could contact exposed energized electrical conductors or circuit parts where an electrical hazard exists. Metal or aluminum ladders are not permitted in EBM facilities.

- k) **Reclosing Circuits After Protective Device Operation:** After a circuit is de-energized by a circuit protective device, the circuit shall not be manually energized until it has been determined that the equipment and circuit can be safely energized. The repetitive manual reclosing of circuit breakers or re-energizing circuits through replaced fuses is prohibited.
- l) **Routine Opening and Closing of Circuits:** Load rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for the opening, reversing, or closing of circuits under load conditions.

The routine operation for opening and closing circuits shall adhere to the following:

- Always properly interrupt the load.
- Always assume a safe position when energizing or de-energizing an electrical enclosure.
- Always, keep head and torso turned away from the disconnect when energizing or de-energizing.
- Maintain solid balance and footing.
- Position your body such that you are not in front of any part of the enclosure or disconnect.
- Energize or de-energize by moving away from the enclosure and the disconnect.
- Stay clear of the electric Arc Blast Zone.

- m) **Safety Signs or Tags:** Safety signs, safety symbols or accident prevention tags shall be used where necessary to warn employees about electrical hazards that might endanger them.

3. General Electrical PPE:

- a) Employees working in areas where there are electrical hazards 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. When an employee is working within the flash protection boundary he/she shall wear protective clothing and other personal protective equipment in accordance with the Flash Hazard Analysis or the listed Hazard Risk Category Classifications.
- b) **Body Protection:** Employees shall wear clothing resistant to flash flame wherever there is a possible exposure to an electric arc flash.
- c) **Coverage:** Clothing shall cover potentially exposed areas as completely as possible. Shirt sleeves shall be fastened at the wrists and shirts shall be closed at the neck. FR Lab coats shall be completely fastened closed.
- d) **Fit:** Tight-fitting clothing shall be avoided. Loose fitting clothing provides additional thermal insulation due to air spaces. FR apparel shall fit properly such that it does not interfere with the work task.
- e) **Hand and Arm Protection:** Employees shall wear rubber insulating gloves with leather protectors where there is a danger of hand and arm injury from electric

shock and burns due to contact with live parts. Hand and arm protection shall be worn where there is possible exposure to arc flash burn.

- f) **Hand Protection:** Gloves made from layers of flame resistant material provide the highest level of hand protection. Heavy-duty leather gloves also provide good protection. Where voltage-rated gloves are used, leather protectors shall be worn over the rubber gloves. The leather protectors also provide good arc-flash protection for the hands.

4. Energized electrical work requirements:

There are three types of electrical work that are permitted to be performed on energized electrical conductors and circuit parts by qualified personnel.

This work includes:

- a) **Troubleshooting:** Work performed on energized electrical conductors and circuit parts to determine the cause and location of a problem. Work done under this heading must be performed only with suitable test instruments.
- b) **Calibration:** Adjustments performed on electronic components with energized electrical conductors and circuit parts to cause a particular parameter to have a specified value or state.
- c) **Repair Work:** Removing, installing modifying or repairing electrical components or wiring on energized electrical conductors or circuit parts.
Conducting repair work of any type in an electrical enclosure with energized electrical conductors and circuit parts requires a Hazardous Work Permit.

The following electrical work procedures are to be followed when electrical work is performed on energized electrical conductors and circuit parts or in the immediate vicinity of energized electrical conductors and circuit parts:

- a) Electrical troubleshooting work may be performed on energized electrical conductors and circuit parts provided that only approved test instruments are used to perform the task and the proper procedures and personal PPE are applied in the troubleshooting process.
- b) Calibration work may be performed on energized electrical conductors and circuit parts provided that only approved test instruments are used to perform the task, there are documented procedures for the calibration, and personal PPE are applied in the calibration process.
- c) **Repair work on energized electrical conductors or circuit parts of any kind is prohibited.**
Conducting repair work of any type in an electrical enclosure with energized electrical conductors and circuit parts requires a Hazardous Work Permit.

Energized Electrical Conductors and Circuit Parts Work = Electrical Hot
(Energized) Work:

By definition, electrical “hot” or energized work is repair work on or in the immediate vicinity of energized electrical conductors or circuit parts. The immediate vicinity is defined as any energized electrical conductor or circuit part that is within the reach of the electrical worker when the work task is being performed. An electrical enclosure is considered “energized” if there are any energized electrical conductors or circuit parts inside the immediate enclosure. This includes the line-side of conductors if the enclosure has a main disconnect integral to the enclosure.

5. General test instruments and equipment:

a) **Test Instruments:**

- Test instruments, equipment, and their accessories shall be rated for circuits and equipment to which they will be connected.
 - All voltage and current instruments shall have a minimum rating of CAT III.
 - Test instruments, equipment, and their accessories shall be designed for the environment to which they will be exposed and the manner in which they will be used.
 - Only qualified persons shall perform testing work on or near live parts operating at 50 volts up to 600 volts AC.
 - Test instruments and equipment and all associated test leads, cables, power cords, probes, and connectors shall be visually inspected for external defects and damage before each use. If there is a defect or evidence of damaged that might expose an employee to injury, the defective or damaged item shall be removed from service, and no employee shall use it until repairs and tests necessary to render the equipment safe have been made.
- b) **Solenoid Type Voltage Testers:** Use of solenoid type voltage testers that activate a spring-loaded solenoid plunger is prohibited. These testers will draw a small arc when contact is made with the measured surface.
- c) **Probe Exposure:** Only the minimum amount of test lead should be exposed on contact type instruments. This minimizes the chance of accidentally causing a short circuit if the test lead contacts more than one conductor at a time.
- d) **Proximity Voltage Testers:** The use of proximity type voltage testers are permitted for general diagnostics. Proximity type voltage testers are **not** permitted for establishing an electrically safe condition.

6. General electrical PPE:

Employees working in areas where there are electrical hazards 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. When an employee is working within the flash protection boundary he/she shall wear protective clothing and other personal protective equipment in accordance with the Flash Hazard Analysis or the listed Hazard Risk Category Classifications.

- a) **Body Protection:** Employees shall wear clothing resistant to flash flame wherever there is a possible exposure to an electric arc flash.
- b) **Coverage:** All parts of the body inside the Arc-Flash Protection Boundary shall be protected. Shirt sleeves shall be fastened at the wrists and shirts shall be closed at the neck.
- c) **Fit:** Tight-fitting clothing shall be avoided. Loose fitting clothing provides additional thermal insulation due to air spaces. FR apparel shall fit properly such that it does not interfere with the work task.
- d) **Hand Protection:** Employees shall wear rubber insulating gloves with leather protectors where there is a danger of hand and arm injury from electric shock and burns due to contact with live parts. Gloves made from layers of flame resistant material provide the highest level of hand protection. Heavy-duty leather gloves also provide good protection. Where voltage-rated gloves are used, leather protectors shall be worn over the rubber gloves. The leather protectors also provide good arc-flash protection for the hands.
 - Rubber gloves with leather protectors **are** required to be worn for all voltage measurements and current measurements where the voltage is greater than 50 volts
 - Leather protectors shall be worn where required for arc flash protection and anytime the hands are inside the Arc Flash Protection Boundary.

7. Minimum required electrical PPE:

The minimum electrical PPE that is required for voltage testing, troubleshooting and calibration on energized electrical systems shall be identified as the EBM Minimum Risk Classification:




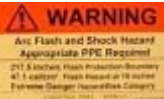
- a) **Footwear:** Electrical Hazard rated work shoes meeting ANSI Z41 PT91 EH
- b) **Insulated Gloves:** Class 00 Rubber Gloves rated at 500 VAC. (Canada: Class 0 Rubber Gloves rated at 600 VAC)
- c) **Leather Protectors:** Leather gloves for wearing over the rubber insulated gloves
- d) **Eye Protection:** Safety Glasses with side shields meeting ANSI Z87.1
- e) **Shirt:** Arc-rated long sleeve with a minimum arc rating of 4
- f) **Pants:** Arc-rated long pants with a minimum arc rating of 4

- g) **Underwear:** 100% cotton
- h) **Glove Bag:** Storage bag for protection of rubber gloves and leather protectors
- i) **Volt Meter:** Electrically rated for CAT III
- j) **Hearing Protection:** Ear canal inserts

NOTES:

1. Clothing made from flammable synthetic materials that melt at temperatures below 315°C (690°F) such as acetate, acrylic, nylon, polyester, polyethylene, polypropylene, and spandex, either alone or in blends shall not be used or worn.
2. Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or unrestrained metal frame glasses) shall not be worn where they present an electrical contact hazard with energized electrical conductors and circuit parts, unless such articles are rendered nonconductive by covering, wrapping, or other insulating means.
3. Coveralls with a minimum arc-rating of 4 can be worn in lieu of arc-rated pants and shirt provided all other clothing is 100% cotton.

ELECTRICAL PPE MATRIX:

ELECTRICAL PPE	EBM MINIMUM RISK CATEGORY	EBM RISK CATEGORY 1	EBM RISK CATEGORY 2	EBM RISK CATEGORY 3	EBM RISK CATEGORY 4	EBM EXTREME HAZARD
	 <1.2 CAL/CM ²	 1.2 – 4 CAL/CM ²	 4 – 8 CAL/CM ²	 8 – 25 CAL/CM ²	 25 – 40 CAL/CM ²	 > 40 CAL/CM ²
EYE PROTECTION	√	√	√	√	√	√
EAR CANAL INSERTS	√	√	√	√	√	√
100% COTTON UNDERWEAR	√	√	√	√	√	√
LONG SLEEVE SHIRT	√*	√	√	√	√	√
LONG PANTS	√*	√	√	√	√	√
COVERALL						√
HARD HAT		√	√	√	√	√
FACE SHIELD		√	√			
BALACLAVA			√			√

ARC-FLASH HOOD				√		
ARC FLASH DOUBLE-LAYER SWITCH HOOD					√	√
ARC FLASH SUIT				√	√	√
EH RATED SAFETY SHOES	√	√				
EH RATED HEAVY-DUTY LEATHER SHOES			√	√	√	√

Note: √*denotes that EBM Risk Category 1 clothing is required at 4 CAL/CM²

EBM MINIMUM RISK CLASSIFICATION

ARC-FLASH WARNING LABEL



NOTES:

1. Denotes EBM Minimum Risk Classification electrical PPE is required
2. Denotes calculated incident energy is less than 1.2 cal/cm²
3. Equates to a Hazard Risk Category 0 in NFPA 70E

EBM Risk Category 1 Classification

EXAMPLE

EBM RISK CATEGORY 1

ARC-FLASH WARNING LABEL



NOTES:

1. Denotes calculated incident energy is greater than 1.2 cal/cm² but less than 4 cal/cm².

PPE Required:

1. Arc-rated shirt and pants with a minimum arc rating of 4 required.
2. Coverall with a minimum arc-rating of 4 can be worn in lieu of arc-rated pants and shirt provided all other clothing is 100% cotton.
3. Underwear of 100% cotton is required.
4. Ear canal inserts hearing protection is required.
5. Safety glasses with side shields eye protection per ANSI Z87 is required.
6. A hard hat per ANSI standard Z89.1 class B with a face shield at a minimum arc rating of 4 is required.
7. Class 00 Rubber gloves with leather protectors is required.
8. Electrical hazard rated shoes per ANSI standard ANSI Z41 PT91 EH is required.

The EBM Risk Category 1 Classification equates to the Hazard Risk Category 1 Classification listed in NFPA 70E. The following potential work conducted on facility premises wiring systems is considered an EBM Category 1 classification as follows:

Panel boards rated 240 V and below:

- Work on energized electrical conductors and circuit parts, including voltage testing
- Removal of bolted covers to expose bare energized electrical conductors and parts

It is **PROHIBITED** to conduct the following tasks unless an Electrically Safe Work Condition is established:

- Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panel board
- Remove/install circuit breakers or fused switches

Panel boards or Switchboards rated >240 V and up to 600 V with molded case or insulated case circuit breakers:

- Perform infrared thermography and other non-contact inspections outside the Restricted Approach Boundary
- Circuit breaker or fused switch operation with covers off

600V Class Motor Control Centers (MCCs):

- Perform infrared thermography and other non-contact inspections outside the Restricted Approach Boundary
- Circuit breaker or fused switch or starter operation with enclosure doors open
- Opening hinged covers (to expose bare energized electrical conductors or circuit parts)

600V Class Switchgear with power circuit breakers or fused switches:

- Circuit breaker or fused switch operation with enclosure doors open

Other 600V Class (277 V through 600 V) Equipment:

Lighting or small power transformers (600 V, maximum)

- Opening hinged covers (to expose bare, energized electrical conductors or circuit parts)
- Cable trough or tray cover removal or installation
- Miscellaneous equipment cover removal or installation

NOTE: Other than electrical troubleshooting, mechanical work on circuits with energized electrical conductors and circuit parts is prohibited.

EBM Risk Category 2 Classification

EXAMPLE

EBM RISK CATEGORY 2

ARC-FLASH WARNING LABEL



NOTES:

1. Denotes calculated incident energy is greater than 4 cal/cm² but less than 8 cal/cm².

PPE Required:

1. Arc-rated shirt and pants with a minimum arc rating of 8 required.
2. Coverall with a minimum arc-rating of 8 can be worn in lieu of arc-rated pants and shirt provided all other clothing is 100% cotton.
3. Underwear of 100% cotton is required.
4. Ear canal inserts hearing protection is required.
5. Safety glasses with side shields eye protection per ANSI Z87 is required.
6. A hard hat per ANSI standard Z89.1 class B with face shield at a minimum arc rating of 8, with wrap-around guarding to protect not only the face, but also the forehead, ears and neck along with a balaclava is required or an arc-flash hood is required.
7. Class 00 Rubber gloves with leather protectors is required.
8. Heavy-duty EH rated leather shoes are required.

The EBM Risk Category 2 Classification equates to the Hazard Risk Category 2 and 2* Classifications listed in NFPA 70E. The following potential work, conducted on facility premises wiring systems, is considered an EBM Risk Category 2 classification as follows:

Panel boards or Switchboards rated >240 V and up to 600 V with molded case or insulated case circuit breakers:

- Work on energized electrical conductors and circuit parts, including voltage testing
- Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panel board or switchboard

600V Class Motor Control Centers (MCCs):

- Work on energized electrical conductors and circuit parts, including voltage testing
- Work on control circuits with energized electrical conductors and circuit parts >120 V exposed
- Application of safety grounds after voltage test

- Work on energized electrical conductors and circuit parts of utilization equipment fed directly by a branch circuit of the panel board or switchboard

600V Class Switchgear with power circuit breakers or fused switches:

- Perform infrared thermography and other non-contact inspections outside the Restricted Approach Boundary
- Work on energized electrical conductors and parts, including voltage testing
- Work on control circuits with energized electrical conductors and circuit parts >120 V exposed
- Application of safety grounds after voltage test
- Opening of hinged covers (to expose bare, energized electrical conductors and circuit parts

Other 600V Class (277 V through 600V) Equipment:

Lighting or small power transformers (600 V, maximum)

- Removal of bolted covers (to expose bare, energized electrical conductors or circuit parts)
- Work on energized electrical conductors and circuit parts including voltage testing
- Application of safety grounds after voltage test*
- Work on energized electrical conductors and circuit parts, including voltage testing*

It is **PROHIBITED** to conduct the following tasks unless an Electrically Safe Work Condition is established:

- Revenue meters (kW-hour, at primary voltage and current) insertion or removal
- Insertion or removal of plug-in devices into or from bus ways

NOTE: Other than electrical troubleshooting, mechanical work on circuits with energized electrical conductors and circuit parts is prohibited

EBM Risk Category 3 Classification

EXAMPLE

EBM RISK CATEGORY 3

ARC-FLASH WARNING LABEL



NOTES:

1. Denotes calculated incident energy is greater than 8 cal/cm² but less than 25 cal/cm².

PPE Required:

1. Arc-rated pants and shirt or coverall provided all undergarment clothing is 100% cotton and an arc flash suit selected so that the total PPE has a minimum arc-rating of 25 is required.
2. Underwear of 100% cotton is required.
3. Ear canal inserts hearing protection is required.
4. Safety glasses with side shields eye protection per ANSI Z87 is required.
5. A hard hat per ANSI standard Z89.1 class B as required dependent of arc-flash hood.
6. An arc-flash hood with a minimum arc-rating of 25 is required.
7. Class 00 Rubber gloves with leather protectors is required.
8. Heavy-duty EH rated leather shoes are required.

The EBM Risk Category 3 Classification equates to the Hazard Risk Category 3 Classification listed in NFPA 70E.

Presently, there are no Hazard Risk Category 3 classifications listed in NFPA 70E that are pertinent to facility premises wiring systems at EBM.

However, there are EBM Risk Category 3 Classifications throughout facilities and they are marked accordingly with their incident energy based on the arc-flash hazard analysis.

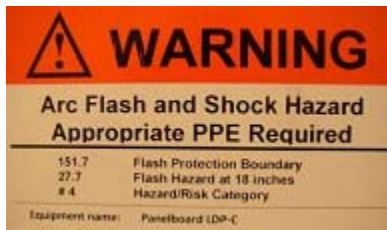
NOTE: Other than electrical troubleshooting, mechanical work on circuits with energized electrical conductors and circuit parts is prohibited.

EBM Risk Category 4 Classification

EXAMPLE

EBM RISK CATEGORY 4

ARC-FLASH WARNING LABEL



NOTES:

1. Denotes calculated incident energy is greater than 25 cal/cm² but less than 40 cal/cm².

PPE Required:

1. Arc-rated pants and shirt or coverall provided all undergarment clothing is 100% cotton and an arc flash suit selected so that the total PPE has a minimum arc-rating of 40 is required.
2. Underwear of 100% cotton is required.
3. Ear canal inserts hearing protection is required.
4. Safety glasses with side shields eye protection per ANSI Z87 is required.
5. A hard hat per ANSI standard Z89.1 class B as required dependent on arc-flash hood.
6. An arc-flash suit hood with balaclava or double-layered switching hood is required with a minimum arc-rating of 40 is required.
7. Class 00 Rubber gloves with leather protectors is required.
8. Heavy-duty leather shoes are required.

The EBM Risk Category 4 Classification equates to the Hazard Risk Category 4 Classification listed in NFPA 70E. The following potential work, conducted on facility premises wiring systems, is considered an EBM Risk Category 4 classification as follows:

600V Class Motor Control Centers (MCCs):

- Removal of bolted covers (to expose bare, energized conductors and circuit parts)

It is **PROHIBITED** to conduct the following tasks unless an Electrically Safe Work Condition is established:

- Insertion or removal individual starter “buckets from MCC

600V Class Switchgear with power circuit breakers or fused switches:

- Insertion or removal (racking) of circuit breakers from cubicles, doors open or closed
- Removal of bolted covers (to expose bare, energized electrical conductors or circuit parts)

NOTE: Other than electrical troubleshooting, mechanical work on circuits with energized electrical conductors and circuit parts is prohibited.

EBM Extreme Hazard

EXAMPLE

EBM EXTREME RISK CATEGORY

ARC-FLASH WARNING LABEL



J. Chemical Hazards

(Ref: CSCP “Environmental Issues”)

1. Before starting any job, the contractor/contractor’s employee(s) must understand the hazards associated with the chemicals that will be used. Any chemicals brought into the facility must be accompanied by an MSDS for the particular chemical. **All chemicals must be reviewed by ENSIL and ENSIL hazard label applied.**
2. ENSIL operates strict Safety Standard for chemical hygiene. After handling chemicals, do not eat, drink or smoke until you have washed your hands.

K. Mechanical Hoist for Lifting

1. All contractors/contractor’s employee(s) are encouraged to use a mechanical hoist for lifting.
2. All operators must be trained and licensed to operate mechanized lifts on ENSIL property.
3. Exceptions are those instances where, in the Contractors/Contractor’s Employee’s good judgment, the object can be safely lifted without a hoist. If there is any doubt, a hoist should be used.
4. No one should lift over 75 pounds alone. Seek assistance even for lifts of less than 75 pounds, if needed.

L. Handling pallets, with or without a load.

1. All operators must be trained and licensed to operate mechanized lifts on ENSIL property.
2. Check for unsafe conditions such as broken boards pulled nails, cracks, or any other defect.
3. Pallets should be stored flat.

4. Never lean pallets against an object by placing them on an edge.

M. Use of ENSIL equipment and tools is prohibited.

1. Unless otherwise covered under the “ENSIL Equipment Loan Agreement.”

N. Ladders

(Ref: CSCP “Ladders and Stairways”)

1. Conductive ladders are prohibited from ENSIL property. Ladders and the use of ladders must comply with ENSIL guideline.

O. Scaffolding

1. Contractor shall comply with all required Local Standards and Code of Practices.
2. Upright scaffolds shall be plumb, secure, and have firm footing. Scaffolds not tied to a structure must be no taller than 4 times the width of the shortest base dimension (including outriggers).
3. Platforms and planks shall be secured or cleated to the scaffold to prevent platform slippage.
4. Platforms shall be at least two planks wide and extend over the supporting surface or edges not less than inches or more than 12 inches. A plank is defined to be at least 1 1/2 inches wide.
5. A safe means shall be available for access to work platforms.
6. Scaffolds more than 10 feet above the ground must have guard rails and toe boards on all open sides and ends.
7. Scaffolds 4 to 10 feet in height, having a minimum dimension in either direction of less than 45 inches, shall have standard guard rails installed on all open sides and ends of the platform.

P. Welding procedures

(Ref. CSCP “Cutting and Welding”)

1. The welding or metal cutting area must be well ventilated; however, strong drafts directed at the welding work should be prevented.
2. Never support welding or cutting work on compressed air cylinders or containers.
3. Never weld or cut in the vicinity of flammable gases or vapors.
4. Never weld a container or drum which held flammable solutions unless it has been thoroughly steam cleaned.
5. Never use pure oxygen to ventilate a welding area.
6. Never weld closed containers, vessels, tanks, or other hollow parts. Before heating, drill a hole in any suspiciously light part made of metal or other materials. A hollow part with no vent hole can explode like a bomb, upon heating.
7. Never weld on a concrete surface. Heated concrete can spall, fly, and injure the welder.

8. Guard all mechanical transmission pans such as gears, shafts, and couplings which are exposed to welding heat.
9. When welding in confined spaces, such as manholes, take precautions to assure a safe exit. Station an attendant immediately outside the work area to assist as needed. Always leave oxygen and acetylene welding tanks outside of the confined space. (See Hazardous Work Permit for confined spaces.)
10. To prevent movement, securely block any heavy portable welding equipment mounted on wheels. The portable unit must have a charged fire extinguisher mounted to the frame.
11. Provide portable fireproof welding curtains to avoid eye injury to personnel in the area.
12. Remove flammable materials from the area and protect those that cannot be removed.
13. A fire watch, which meets ENSIL approval, must be maintained.

Q. Wearing hard hats

1. Required on roof where bump hazard is present.
2. Required in all posted areas.
3. Required depending on activity as indicated by ENSIL representative.
4. Required in barricaded areas when overhead work is being conducted.

REFERENCES:

- SS 506 - 1 : 2009 Occupational safety and health (OSH) management systems - Requirements
- **Asbestos**
The Factories (Asbestos) Regulations 1980
Code of Practice for Handling of Asbestos Materials (Department of Industrial Health Ministry of Manpower, Guidelines on the Removal of Asbestos Materials in Buildings (Department of Industrial Health, Ministry of Manpower
Air Sampling and Analysis Guide 1996, Department of Industrial Health, Ministry of Manpower
Singapore Standard CP 74:1998 Code of Practice for Selection, use and maintenance of respiratory protective devices
- **Confined Space Entry** - WSH (Confined Spaces) Regulations
- **Confined Space Entry** - CP84: 2000 Code of practice for entry into and safe working in confined spaces
- **Electrical Safety**
CP 5: 1998 Code of Practice for Electrical Installations
AMD CP 5 : 2008 Amendment No. 1 to CP 5 - Code of practice for electrical installations
SS 254 Part 0:2001 Specification for electrical apparatus for explosive gas atmospheres, Part 0 General requirements (Identical adoption of IEC 60079-0:2000)
Singapore Standard CP 88 : Part 1: 2001 (ICS 29.260.10) Code of Practice for Temporary electrical Installations Part 1: Construction and building sites
Singapore Standard SS 538: 2008 (ICS 29.020) Code of Practice for Maintenance of electrical equipment of electrical installations

NFPA 70 The National Electric Code 2008 Edition

NFPA 70B Recommended Practice for Electrical Equipment Maintenance 2006 Edition

NFPA 70E The Standard for Electrical Safety Requirements for Employee Workplaces 2009 Edition

NFPA 79 The Electrical Standard for Industrial Machinery 2007 Edition

- **Excavations / Trenching / Shoring** - Singapore Standard CP 4: 2003 (ICS 91.040; 93.020) Code of Practice for Foundations; Building Control Act (Chapter 29)
- **Fall Protection** - Singapore Standard CP 11: 2002 Code of Practice for Demolition; WSH (Construction) Regulations; SS 402: 1997 Specification for industrial safety belts and harnesses, Part 1: 1997 General requirements, Part 2 : 1997 Permanent anchors; SS 528 – Specification for personal fall-arrest systems Part 1: 2006 Full-body harnesses, Part 2: 2006 Lanyards and energy absorbers, Part 3: 2006 Self-retracting lifelines, Part 4: 2006, Vertical rails and vertical lifelines incorporating a sliding-type fall arrester, Part 5: 2006 Connectors with self-closing and self-locking gates, Part 6: 2006 System performance tests
- **Fire Prevention and Protection**
SS 532: 2007 Singapore Standard Code of Practice for the Storage of Flammable Liquids
CP 29 :1998 Code of practice for fire hydrant systems and hose reels
- **Hazardous Energy Control (Lockout / Tagout)** - Singapore Standard CP 91: 2001 (ICS 13.110) Code of Practice for Lockout procedure
- **Hot work Permits** - Singapore Standard 510: 2005 Code of Practice on Safety in Welding and Cutting (and other operations involving the use of heat)
- **Identification of Hazardous Material**
Singapore Standard SS 586: Specification for Hazard communication for hazardous chemicals and dangerous goods
Part 1: 2008 (ICS 13.300) Transport and storage of dangerous goods
Part 2: 2008 (ICS 13.300) Globally harmonised system of classification and labelling of chemicals – Singapore’s adaptations
Part 3: 2008 (ICS 13.300; 71.020) Preparation of safety data sheets (SDS)
- **Personal Protective Equipment**
CP 76: 1999 Code of practice for the selection, use, care and maintenance of hearing protectors
SS 98: 2005 Industrial safety helmets; SS 473 - 1: 1999 Personal eye-protectors (General requirements)
SS 473 - 2: 1999 Personal eye-protectors (Selection, use and maintenance)
SS 513 - 1: 2005 Personal protective equipment (Footwear - Safety footwear)
ANSI Z87.1 Practice for Occupational and Educational Eye and Face Protection, 2003
ANSI Z89.1 Requirements for Protective Headwear for Industrial Workers, 2003
ASTM D 120 Standard Specifications for Rubber Insulating Gloves, 2002a (2006)
ASTM F 479 Standard Specification for In-Service Care of Insulating Blankets 2006
ASTM F 496 Standard Specifications for In-Service Care of Insulating Gloves and Sleeves, 2006

ASTM F 696 Standard Specifications for In-Service Care of Insulating Gloves and Sleeves, 2006

ASTM F 819-08 Standard Terminology Relating to Electrical Protective Equipment for Workers

ASTM F 1236 Standard Guide for Visual Inspection of Electrical Protective Rubber Products, 2007

ASTM F 2178 Standard Test Method for Determining the Arc Rating and Standard Specifications for Face Protective Products 2006

ASTM F 2412 Standard Test Methods for Foot Protection, 2005

ASTM F 2413 Standard Specification for Performance Requirements for Foot Protection, 2005

ASTM F 1506 Standard Specifications for Protective Wearing Apparel for Use by Electrical Workers When Exposed to Momentary Electric Arc and Related Thermal Hazards, 2002a

- **Respiratory Protection** - CP 74 : 1998 Code of practice for selection, use, and maintenance of respiratory protective devices
- **Scaffolds and Ladders**
 - CP 14: 1996 (ICS 91.220) Code of practice for scaffolds
 - CP 20: 1999 Code of practice for suspended scaffolds
 - CP 23: 2000 Code of practice for formwork
 - SS 176 : Portable aluminium ladder
 - CP 63: Code of Practice for the lifting of persons in work platforms suspended from cranes
- **IEEE** The Other Electrical Hazard: Electric Arc Blast Burns by Ralph H. Lee
- **IEEE** Predicting Incident Energy to Better Manage the Electric Arc Hazard on 600 V Power Distribution Systems Paper
No. PCIC-98-36
- **NFPA** Electrical Safety in the Workplace by Ray a. Jones, P.E. and Jane G. Jones
- **McGraw Hill** Electrical Safety Handbook – Second Edition by John Cadick, P.E. Mary Capelli-ScgellPfeffer, M.D., M.P.A., and
Dennis Neitzel, CPE