OBJECTIVE:

The purpose of this program is to provide guidelines to Big Ox Energy - Siouxland LLC's employees where they may be exposed to live electrical contacts, electrical parts and/or those parts that have been de-energized. Effective steps shall be taken to control electrical hazards and prevent electric shock or other injuries resulting from electrical contacts.

Scope

To define the procedures, responsibilities and safety of Big Ox Energy - Siouxland LLC personnel who work with electrical equipment or systems.

ENGINEERING CONTROL/WORK PRACTICES

The appropriate controls shall be put in place for those who work with or in close proximity to electrical systems. The following will be followed prior to commencing such work:

- DANGER signs shall be displayed in appropriate locations and on associated equipment, as required, to afford maximum personnel protection.
- All equipment must be de-energized before work can be done on it. De-energized equipment will be prepared and locked out according to applicable Lock-out/Tag-out policies.
- Adequate lighting must be available in the work area before electrical maintenance may begin.
- Conductive items of jewelry or clothing shall not be worn, or shall be rendered nonconductive by covering, wrapping or other insulating means.
- When using electrical tools, protection shall be provided by use of a ground fault circuit interrupter (GFCI), or following an assured grounding program.
- Protective shields, insulating materials and appropriate clearance distances for personnel, vehicles and/or equipment shall be used to prevent electrical contacts.
- Portable ladders shall have non-conductive side rails.
- Approach Distances for Vehicles/Equipment and Qualified Employees.
- Overhead electrical hazards shall be identified by proper signage, such as DANGER - OVERHEAD LINES or DANGER - HIGH VOLTAGE ABOVE.
- Overhead electrical hazards shall be identified and protective measures shall be taken. Measures such as de-energizing and grounding may need to be implemented. At a minimum, identification of the minimum standoff distance must be communicated to all persons.
- Identification of exposed live parts (involving either direct contact or by means of tools or materials) or near enough to them for employees to be exposed to any hazard they present.

Job tasks that involve handling long dimensional conductive objects shall be managed to prevent accidental contact with electrical sources. Control measures may include, but are not limited to, de-energizing the electrical source, job postponement, relocation of the work area, use of adequate approach and standoff distances, and/or refresher training in materials handling. Any unqualified person, vehicle or mechanized equipment capable of having parts of its structure elevated near energized overhead lines shall maintain a minimum clearance from those lines of 20 ft, following the OSHA table for higher voltages.

The OSHA standard outlines three options of programmatic requirements containing elements that include such things as training, planning meetings, elevated warning lines, dedicated spotters, insulating load links, non-conductive tag lines, special signage, power line proximity detectors on the crane, range control limit devices, and possibly even a registered PE's involvement. The specific elements to be implemented in order to comply with the new standard depends upon which one of the three options are selected as well as applicability of other

OSHA standards including OSHA's Power Generation Transmission and Distribution Standards (1910.269), and Subpart V of 1926 construction standards.

The OSHA Crane standard requires an assessment which include identifying the work zone by one of various means which could include demarcating boundaries (such as with flags, or a device such as a range limit device or range control warning device) or defining the work zone area as the area 360 degrees around the equipment up to the equipments maximum working radius, in order to insure no part of the crane, load line or load (including all rigging accessories) can get closer than 20 ft. to a power line. If there is the ability for a crane to get closer than 20ft to a power line then the employer must meet additional requirements outlined in one of three options.

1.) Deenergize and ground. Confirm from the utility owner/operator that the power line has been deenergized and visibly grounded at the worksite.
The cardinal rule for qualified electrical workers is and has always been, **"if it's not grounded, it's not dead"**. This new standard also presumes that all power lines are energized unless the line is deenergized and visibly grounded at the worksite. Deenergization alone is not acceptable since any power line which has been deenergized can still contain a lethal voltage due to induced/inductive coupling, inadvertent reenergization at the source, lightning strikes upstream on the utility system and/or other factors.

2.) 20 foot clearance. Ensure that no part of the equipment, load line, or load (including rigging and lifting accessories), gets closer than 20 feet to the power line by implementing the measures specified in paragraph (b)of this section.
If the assessment shows that the crane could get closer than the 20 foot trigger distance then additional actions are required. These additional actions are more voluminous and detailed. They include such things as: a planning meeting with minimum specified agenda items to be covered, non-conductive tag lines (which need to meet the applicable ASTM standards), Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at 20 feet from the power line, If the operator is unable to see the elevated warning line, a dedicated spotter must be used with more actions required (including additional items such as positioning to effectively assess the clearance distance, direct and continuous communications with the crane operator to insure the clearance distance can be maintained).

Additionally one of the following must also be implemented:
• A proximity alarm set to give the operator sufficient warning to prevent encroachment.
• A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.
• A device that automatically limits range of movement, set to prevent encroachment.
• An insulating link/device, installed at a point between the end of the load line (or below) and the load. Such a device must also be listed by an OSHA Nationally Recognized Testing Laboratory (NRTL).

These additional measures state that employees who may come in contact with the equipment, load line or the load must be insulated or guarded from the equipment, the load line and the load. One option recognized by the standard could be the use of insulating gloves rated for the voltage involved. Naturally there are voltage limits based upon the class of the gloves and they obviously can only be used at distribution level voltages (below 36,500 volts). Also issuing this type of PPE to employees requires additional employee training.
Option 3 is required when the crane has the ability to encroach boundaries specified in Table A of the OSHA Crane standard.

Option 3: Determining Minimum Clearance Based on Power Line Voltage

In situations where maintaining the minimum 20 foot clearance is not possible, the minimum clearance can be calculated based on the power line's voltage. The Operator should contact the utility to inquire about the rated voltage of the lines in question. Using the table below, the minimum clearance can be determined, then the steps in Option 2 can be subsequently completed.

Voltage (A/C)	Minimum Clearance
Up to 50,000 V	10 feet
50,001 to 200,000 V	15 feet
200,001 to 350,000 V	20 feet
350,001 to 500,000 V	25 feet
500,001 to 750,000 V	35 feet
750,001 to 1,000,000 V	45 feet
1,000,001 V or Greater	As established by the utility or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution, but not less than 50 feet.

Equipment Grounding Conductor Program

This written plan is intended to establish and implement specific procedures for equipment grounding conductor program covering:

- All cord sets,
- Receptacles which are not a part of the building or structure, and
- Equipment connected by cord and plug which are available for use or used by employees.

Equipment Grounding Conductor Inspection

- Each cord set, attachment cap, plug and receptacle of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage, shall be visually inspected before each day's use for:
- External defects, such as deformed or missing pins or insulation damage, and
- Indications of possible internal damage.
- Equipment found damaged or defective is not to be used until repaired, and is to be removed from service immediately by the person finding it and tagged 'DO NOT USE'.

Equipment Grounding Conductor Testing

The following tests shall be performed on all cord sets, receptacles which are not a part of the permanent wiring of the building or structure, and cord- and plug-connected equipment required to be grounded:

- All equipment grounding conductors shall be tested for continuity with approved testing equipment.
- Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor will be connected to its proper terminal.

Testing on extension cord sets and 3 wire grounded tool cords shall be performed as follows:

- Before first use.
- Before equipment is returned to service following any repairs.

- Before equipment is used after any incident which can be reasonably suspected to have caused damage (for example, when a cord set is run over).
- At least every 3 months. Cord sets and receptacles which are fixed will be tested at least every 6 months.

Big Ox Energy - Siouxland LLC does not provide or permit employees to use any equipment which has not met the requirements of this program. Tests performed as required in this program are recorded. The test records:

- Identify each receptacle, cord set, and cord- and plug-connected equipment that passed the test, and;
- Indicate the last date it was tested or the interval for which it was tested using either a marked tag system or color code system

Conductors and parts of electrical equipment that have been de-energized but not been locked or tagged out shall be treated as though they are live.

Establishing an Electrically Safe Work Condition

The most important principle of electric safety is, **assume electric circuits are energized unless you make sure they are not**. Test every circuit and conductor every time you work on them. The National Fire Protection Association lists six steps to ensure conditions for electrically safe work.

- Identify all sources of power to the equipment.
- Interrupt the load current, and then open the disconnecting devices for each power source.
- Where possible, visually verify that blades of disconnecting devices are fully open or that draw out-type circuit breakers are fully withdrawn.
- Apply lockout/tagout devices in accordance with a formal, written policy.
- Test each phase conductor or circuit part with an adequately rated voltage detector to verify that the equipment is de-energized. Check the voltage detector before and after each test to be sure it is working.
- Properly ground all possible sources of induced voltage and stored electric energy (such as, capacitors) before touching. If conductors or circuit parts that are being de-energized could contact other exposed conductors or circuit parts, apply ground-connecting devices rated for the available fault current.

The process of de-energizing is "live" work and can result in an arc flash due to equipment failure. When de-energizing, follow the procedures described below in "Working On or Near Live Circuits."

Working On or Near Live Circuits

Working on live circuits means actually touching energized parts. Working near live circuits means working close enough to energized parts to pose a risk even though you make be working on de-energized parts. Common tasks where you need to work on or near live circuits include:

- Taking voltage measurements
- Opening and closing disconnects and breakers
- Racking breakers on and off the bus
- Removing panels and dead fronts
- Opening electric equipment doors for inspection.

There should be standard written procedures and training for these common tasks. For instance, when opening and closing disconnects, use the **left-hand rule** when possible (stand to the right side of the equipment and operate the disconnect mechanism with your left hand). For other situations where you could work on or near live circuits, your employer should institute a written live work permit system which must be authorized by a qualified supervisor.

Live-work permit system

A completed live work permit should, at a minimum, contain this information:

- A description of the circuit and equipment to be worked on and location
- The date and time covered by the permit
- Why live work will be done
- Results of shock hazard analysis and determination of shock protection boundaries
- Results of flash hazard analysis and determination of flash protection boundary
- PPE to be worn and description of safe work practices to be used
- Who will do the work and how unqualified persons will be kept away
- Evidence of completion of job briefing, including description of job-specific hazards.

Approach distances to exposed live parts

The National Fire Protection Association defines approach distances for shock hazards and one for arc flash.

Electric shock *(see* table 1).
The **limited approach boundary** is the closest distance an unqualified person can approach, unless accompanied by a qualified person.
The **restricted approach boundary** is the closest distance to exposed live parts a qualified person can approach without proper PPE and tools. Inside this boundary, accidental movement can put a part of your body or conductive tools in contact with live parts or inside the prohibited approach boundary. To cross the restricted approach boundary, the qualified person must:

1. Have a documented plan that is approved by the manager responsible for the safety plan.
2. Use PPE suitable for working near exposed live parts and rated for the voltage and energy level involved.
3. Be certain that no part of the body enters the prohibited space.
4. Minimize the risk from unintended movement, by keeping as much of the body as possible out of the restricted space; body parts in the restricted space should be protected.

The **restricted approach boundary** is the minimum approach distance to exposed live parts to prevent flashover or arcing. Approaching any closer is comparable to making direct contact with a live part. To cross the restricted approach boundary, the qualified person must:

1. Have specified training to work on exposed live parts.
2. Have a documented plan with proper written work procedures and justifying the need to work that close.
3. Do a written risk analysis.
4. Have (2) and (3) approved by the manager responsible for the safety plan.
5. Use PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved.

Arc flash

The **flash protection boundary** is the distance at which PPE is needed to prevent incurable burns (2nd degree or worse) if an arc flash occurs.

Remember; when you have de-energized the parts you are going to work on, but are still inside the flash protection boundary for nearby live exposed parts: If the parts cannot be de-energized, you must use barriers such as insulated blankets to protect against accidental contact or you must wear proper PPE.

Proper Personal Protective Equipment

When working on or around live circuits, be sure to wear the right PPE to protect against electric shock and **arc flash.** Never wear clothing made from synthetic materials, such as acetate, nylon, polyester, or rayon – alone or combined with cotton. Such clothing is dangerous because it can burn and melt into your skin. The type of PPE worn depends on the type of electric work being done (*see* table 3).

Determining the Method of Arc Flash Analysis:

An Arc Flash Hazard Analysis shall determine the Arc Flash Protection Boundary and the personal protective equipment that people with in that boundary shall wear. Two methods to determine your protection are:

a) An Engineered Detailed Arc Flash Hazard Analysis which is documented with spelled out details on labels located on the equipment. (This is an analysis that the customer will have had performed by a qualified engineer or engineering firm).

b) The other method would be using the NFPA 70E recognized exceptions, which is:

   In lieu of the Engineered detailed study, the combination of the NFPA 70E's Arc Flash Hazard Identification table 130.7(C)(15)(A)(a), PPE Categories Chart 130.7(C)(15)(A)(b), PPE Table 130.7(C)(16), and the Shock Protection Boundary Chart 130.4(D)(a) can be used to determine the level of PPE and Boundaries, ***provided*** that all of the notes and exceptions can qualify the use of these charts. These notes are listed at the charts and as notes after the charts as per the NFPA 70E.

Once the hazard/risk category has been identified, check requirements for clothing and other PPE when working on or near energized equipment within the flash protection boundary (*see* tables 3 and 4). These PPE requirements protect against electric shock and incurable arc-flash burns. They do not protect against physical injuries from arc blasts.

The **minimum** PPE required would be an untreated natural fiber long-sleeve shirt and long pants with safety glasses with side shields (hazard/risk category 0).

Table 1- Approach Distances

Approach Distances for Qualified Employees - Alternating Current	
Voltage range (phase to phase)	**Minimum approach distance**
300V and less	Avoid contact
Over 300V, not over 750V	1 ft. 0 in.
Over 750V, not over 2kV	1 ft. 6 in.
Over 2kV, not over 15kV	2 ft. 0 in.
Over 15kV, not over 37kV	3 ft. 0 in.
Over 37kV, not over 87.5kV	3 ft. 6 in.
Over 87.5kV, not over 121kV	4 ft. 0 in.
Over 121kV, not over 140kV	4 ft. 6 in.

TRAINING

Every employee who faces the potential risk of electric shock from working with equipment, portable electrical cords or de-energized electrical sources shall receive training in electrical related safety work practices pertaining to the individual's job assignment. All employees who face a risk of electric shock shall be trained in basic electric safety practices and any job-specific safety practices necessary.

The goal of the electrical safety training program is to ensure that all employees understand the hazards associated with electrical energy and that they are capable of performing the necessary steps to protect themselves and their co workers. **Only qualified persons may work on electric circuit parts or equipment that have not been de-energized. Such persons shall be made familiar with the use of special precautionary techniques, PPE, insulating & shielding materials and insulated tools.**

The electrical training program covers these basic elements:

- Sources of potential electrical contacts.
- Minimum safe approach/clearance distances for energized lines and equipment.
- Lockout and tagging of conductors and parts of electrical equipment.
- Safe procedures for de-energizing circuits and equipment
- Application of locks and tags.
- Verification that the equipment has been de-energized.
- Procedures for reenergizing the circuits or equipment.
- Other electrically related information which is necessary for employee safety.

OTHER REQUIREMENTS

Insubordination in regards to this standard will be dealt with as per Big Ox Energy - Siouxland LLC's Disciplinary Program.

Table 2 Arc Flash Hazard Identification for Alternating Current (ac) and Direct Current (dc) Systems

Task	**Equipment Condition***	**Arc Flash PPE Required**
Reading a panel meter while operating a meter switch	Any	No
Normal operation of a circuit breaker (CB), switch, contactor or starter	All of the following: The equipment is properly installed The equipment is properly maintained All equipment doors are closed and secured All equipment covers are in place and secured There is no evidence of impending failure	No
	One or more of the following: The equipment is not properly installed The equipment is not properly maintained Equipment doors are open or not secured Equipment covers are off or not secured There is evidence of impending failure	Yes
For ac systems: Work on energized electrical conductors and circuit parts, including voltage testing	Any	Yes
For dc systems: Work on energized electrical conductors and circuit parts of series-connected battery cells, including voltage testing	Any	Yes
Voltage testing on individual battery cells or individual multi-cell units	All of the following: The equipment is properly installed The equipment is properly maintained Covers for all other equipment are in place and secured There is no evidence of impending failure	No
	One or more of the following: The equipment is not properly installed The equipment is not properly maintained Equipment doors are open or not secured Equipment covers are off or not secured There is evidence of impending failure	Yes
Removal or installation of CBs or switches	Any	Yes
Removal or installation of covers for equipment such as wireways, junction boxes, and cable trays that does not expose bare energized electrical conductors and circuit parts	All of the following: The equipment is properly installed The equipment is properly maintained There is no evidence of impending failure	No
	Any of the following: The equipment is not properly installed The equipment is not properly maintained There is evidence of impending failure	Yes
Removal of bolted covers (to expose bare energized electrical conductors and circuit parts). For dc systems, this includes bolted covers, such as battery terminal covers.	Any	Yes

Table 2 Arc Flash Hazard Identification for Alternating Current (ac) and Direct Current (dc) Systems		
Task	**Equipment Condition***	**Arc Flash PPE Required**
Removal of battery intercell connector covers	All of the following: The equipment is properly installed The equipment is properly maintained Covers for all other equipment are in place and secure There is no evidence of impending failure	No
	One or more of the following: The equipment is not properly installed The equipment is not properly maintained Equipment doors are open or not secured Equipment covers are off or not secured There is evidence of impeding failure	Yes
Opening hinged door(s) or cover(s) (to expose bare energized electrical conductors and circuit parts)	Any	Yes
Perform infrared thermography and other noncontact inspections outside the restricted approach boundary. This activity does not include opening of doors or covers.	Any	No
Application of temporary protective grounding equipment after voltage test	Any	Yes
Work on control circuits with exposed electrical conductors and circuit parts, 120 volts or below without any other exposed energized equipment over 120 volts including opening of hinged covers to gain access	Any	No
Work on control circuits with exposed energized electrical conductors and circuit parts, greater than 120 V	Any	Yes
Insertion or removal (racking) of CBs or starters from cubicles, doors open or closed	Any	Yes
Insertion or removal of plug-in devices into or from busways	Any	Yes
Insulated cable examination with no manipulation of cable	Any	No
Insulated cable examination with manipulation of cable	Any	Yes
Work on exposed energized electrical conductors and circuit parts of equipment directly supplied by a panelboard or motor control center	Any	Yes
Insertion and removal of revenue meters (kW-hour at primary voltage and current)	Any	Yes
For dc systems, insertion or removal of individual cells or multi-cell units of a battery system in an enclosure	Any	Yes
For dc systems, insertion or removal of individual cells or multi-cell units of a battery system in an open rack	Any	No

Table 2 Arc Flash Hazard Identification for Alternating Current (ac) and Direct Current (dc) Systems

Task	Equipment Condition*	Arc Flash PPE Required
For dc systems, maintenance on a single cell of a battery system or multi-cell units in an open rack	Any	No
For dc systems, work on exposed energized electrical conductors and circuit parts or utilization equipment directly supplied by a dc source	Any	Yes
Arc-resistance switchgear Type 1 or 2 (for cleaning times of <0.5 sec with a prospective fault current not to exceed the arc-resistant rating of the equipment) and metal enclosed interrupter switchgear, fused or unfused of arc resistant type construction tested in accordance with IEEE C37.20.7: Insertion or removal (racking) of CBs from cubicles Insertion or removal (racking) of ground and test device • Insertion or removal (racking) of voltage transformers on or off the bus	All of the following: The equipment is properly installed The equipment is properly maintained All equipment doors are closed and secured All equipment covers are in place and secured There is no evidence of impending failure	No
	One or more of the following: The equipment is not properly installed The equipment is not properly maintained Equipment doors are open or not secured Equipment covers are off or not secured There is evidence of impending failure	Yes
Opening voltage transformer or control power transformer compartments	Any	Yes
Outdoor disconnect switch operation (hookstick operated) at 1 kV through 15 kV	Any	Yes
Outdoor disconnect switch operation (gang-operated, from grade) at 1 kV through 15 kV	Any	Yes

Note: Hazard identification is one component of risk assessment. Risk assessment involves a determination of the likelihood of occurrence of an incident, resulting from a hazard that could cause injury or damage to health. The assessment of the likelihood of occurrence contained in this table does not cover every possible condition or situation. Where the table indicates that arc flash PPE is not required, an arc flash is not likely to occur.

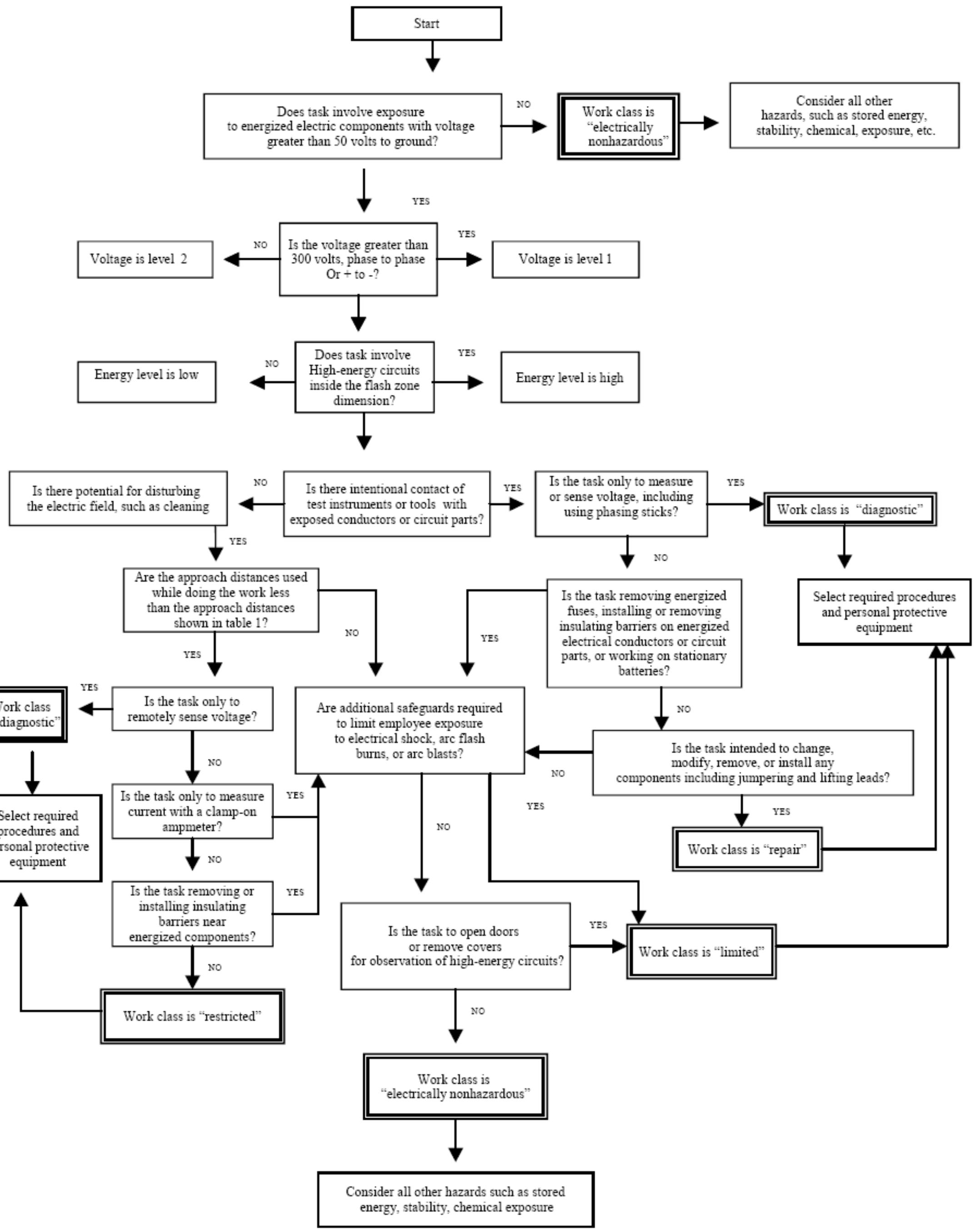
*The phrase properly installed , as used in this table, means that the equipment is installed in accordance with applicable industry codes and standards and the manufacturer's recommendations. The phrase properly maintained , as used in this table, means that the equipment has been maintained in accordance with the manufacturer's recommendations and applicable industry codes and standards. The phrase evidence of impending failure , as used in this table, means that there is evidence of arcing, overheating, loose or bound equipment parts, visible damage, deterioration, or other damage.

Table 3 Arc-Flash Hazard PPE Categories for Alternating Current (ac) Systems		
Equipment	**Arc Flash PPE Category**	**Arc Flash Boundary**
Panelboards or other equipment rated 240V and below Parameters: Maximum of 25 kA short-circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)	1	19 in.
Panelboards or other equipment rated >240V and up to 600V Parameters: Maximum of 25 kA short-circuit current available; maximum 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)	2	3ft.
600-V class motor control centers (MCCs) Parameters: Maximum of 65 kA short-circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 (18 in.)	2	5 ft
600-V class motor control centers (MCCs) Parameters: Maximum of 42 kA short-circuit current available; maximum of 0.33 sec (20 cycles) fault clearing time; working distance 455 mm (18 in.)	4	14 ft
600-V class switchgear (with power circuit breakers or fused switches) and 600 V class switchboards Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.5 sec (30 cycles) fault clearing time; working distance 455 mm (18 in.)	4	20 ft
Other 600-V class (277 V through 600 V, nominal) equipment Parameters: Maximum of 65 kA short circuit current available; maximum of 0.03 sec (2 cycles) fault clearing time; working distance 455 mm (18 in.)	2	5 ft
NEMA E2 (fused contactor) motor starters, 2.3 kV through 7.2 kV Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.24 sec (15 cycles) fault clearing time; working distance 910 mm (36 in.)	4	40 ft
Metal-clad switchgear, 1 kV through 15 kV Parameters: Maximum of 35 kA sort-circuit current available; maximum of up to 0.24 sec (15 cycles) fault clearing time; working distance 910 mm (36 in.)	4	40 ft
Arc-resistant switchgear Type 1 or 2 [for clearing times of <0.5 sec (30 cycles) with a perspective fault current not to exceed the arc-resistant rating of the equipment], and metal-enclosed interrupter switchgear, fused or unfused of arc-resistant-type construction, tested in accordance with IEEE C37.20.7, 1 kV through 15 kV Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.24 sec (15 cycles) fault clearing time; working distance 910 mm (36 in.)	N/A (doors closed) 4 (doors open)	N/A (doors closed) 40 ft
Other equipment 1 kV through 15 kV Parameters: Maximum of 35 kA short-circuit current available; maximum of up to 0.24 sec (15 cycles) fault clearing time; working distance 910 mm (36 in.)	4	40 ft
Note: for equipment rated 600 volts and below, and protected by upstream current-limiting fuses or current-limiting circuit breakers sized at 200 amperes or less, the arc flash PPE category can be reduced by one number but not below arc flash PPE category 1.		

Table 4 Personal Protective Equipment (PPE)	
PPE Category	**PPE**
1	**Arc-Rated Clothing, Minimum Arc Rating of 4 cal/cm2** (see Note 1) Arc-rated long-sleeve shirt and pants or arc-rated coverall Arc-rated face shield (see Note 2) or arc flash suit hood Arc-rated jacket, parka, rainwear, or hard hat liner (AN) **Protective Equipment** Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Heavy duty leather gloves (see Note 3) Leather footwear (AN)
2	**Arc-Rated Clothing, Minimum Arc Rating of 8 cal/cm2** (see Note 1) Arc-rated long-sleeve shirt and pants or arc-rated coverall Arc-rated flash suit hood or arc-rated face shield (see Note 2) and arc-rated balaclava Arc-rated jacket, parka, rainwear, or hard hat liner (AN) **Protective Equipment** Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Heavy duty leather gloves (see Note 3) Leather footwear
3	**Arc-Rated Clothing Selected so That the System Arc Rating Meets the Required Minimum Arc Rating of 25 cal/cm2** (see Note 1) Arc-rated long-sleeve shirt (AR) Arc-rated pants (AR) Arc-rated coverall (AR) Arc-rated arc flash suit jacket (AR) Arc-rated arc flash suit pants (AR) Arc-rated arc flash suit hood Arc-rated gloves (see Note 1) Arc-rated jacket, parka, rainwear, or hard hat liner (AN) **Protective Equipment** Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather footwear
4	**Arc-Rated Clothing Selected so That the System Arc Rating Meets the Required Minimum Arc Rating of 40 cal/cm2** (see Note 1) Arc-rated long-sleeve shirt (AR) Arc-rated pants (AR) Arc-rated coverall (AR) Arc-rated arc flash suit jacket (AR) Arc-rated arc flash suit pants (AR) Arc-rated arc flash suit hood Arc-rated gloves (see Note 1) Arc-rated jacket, parka, rainwear, or hard hat liner (AN)

	Protective Equipment Hard hat Safety glasses or safety goggles (SR) Hearing protection (ear canal inserts) Leather footwear
	AN: as needed (optional). AR: as required. SR: selection required. Notes: (1) *Arc rating* is defined in NFPA 70E Article 100. (2) Face shields are to have wrap-around guarding to protect not only the face but also the forehead, ears, and neck, or, alternatively, an arc-rated arc flash suit hood is required to be worn. (3) If rubber insulating gloves with leather protectors are used, additional leather or arc-rated gloves are not required. The combination of rubber insulating gloves with leather protectors satisfies the arc flash protection requirement.

Figure 1. Hazard / risk analysis flow



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ENERGIZED WORK PLANNING PERMIT

Requesting Person_________________________________ Job Name____

Equipment/Machine to be Locked Out and Tagged Out____

Equipment and/or Circuits to be worked on energized____

Date(s) of work to be performed ____

Work to be performed ____

Energy Source and Location ____

Statement of why equipment cannot be de-energized____

____

Is it possible to reschedule work at a later date when equipment may be de-energized? YES ☐ NO ☐

Hazards (risk to personnel, property, production)

____

____

Results of Shock/Flash Hazard Analysis:

Flash Protection Boundary ______________ PPE Category _____________

Restricted Approach Boundary ___________ Limited Approach Boundary ___________

Employees who will be performing the energized work ____

Have employees been properly trained? Yes ☐ No ☐

Have affected employees been notified of procedures and hazards? Yes ☐ No ☐

Date of Notification _________________________ Competent person assigned ____________________________

List personal protective equipment needed____

Date equipment last tested _________________________ Tested by: ____________________________________

Has written plan/Job Hazard Analysis (JHA) been completed for energized work? ____________________, attach copy.

Job Supervisor ____ Date _________________

Manager ____ Date __________________