St. Norbert College

ELECTRICAL SAFETY POLICY (29 CFR 1910.137, 269 & 302-335)

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1. **INTRODUCTION** - The purpose of the St. Norbert College Electrical Safety Policy is to prevent electric shock or other injuries resulting from either direct or indirect electrical contact, when work is performed near or on equipment or circuits that are or may be energized

2. **SCOPE** - This document applies to all faculty, staff, and any contractors working on St. Norbert College property. This policy covers electrical safety-related work practices for both qualified persons and persons who are working on, near, or with the following installations:

    a. **Premises Wiring** – Installations of electrical conductors and equipment within or on buildings or other structures, and on other premises such as yards, parking and other lots and industrial substations.

    b. **Wiring for Connection to Supply** – Installations of conductors that connect to the supply of electricity.

    c. **Other Wiring** – Installations of other outside conductors on the premises.

    d. **Exposed Energized Parts** – Installations that involve work performed by unqualified persons on or near exposed energized parts.

    e. **Exposed or Damaged** wiring, plugs, cords, and other electrical components.

3. **RESPONSIBILITIES**

    a. **Departments** - The Human Resources (HR) Environmental Health and Safety Specialist and the Director of Facilities (or their designee) will work closely with each other to ensure that when electrical equipment and/or components are damaged, they are repaired by qualified personnel or replaced. This process will ensure personnel are not allowed use of damaged or worn equipment – the risk is too great.

    b. **HR Environmental Health and Safety Specialist:**

        i. Coordinate the overall Electrical Safety policy within the college.

        ii. Facilitate initial training for applicable departments within the college and document such training.

        iii. Conduct periodic (annual) inspections of the departments' electrical equipment, machinery and components.

    c. **Facilities Departmental Managers:**

i. Ensure that an inventory of all college owned machinery and equipment that are serviced or maintained by employees with their area of responsibility, is completed.

ii. Oversee the completion of periodic (annual) inspections of electrical equipment, machinery and electrical components to ensure employees are not exposed to electrical hazards.

iii. Ensure that repairs or replacements made to electrical equipment, machinery or components are made by a qualified person, or approved contractors / vendors.

d. Employees:

i. Use personal protective equipment (PPE) as instructed and in accordance with work function or as directed by supervisors.

ii. Recognize the hazards associated with damaged or worn electrical components (such as frayed cords, missing ground pins in plugs, etc.). Place damaged equipment "out of service".

iii. Employees shall not attempt to repair electrical equipment, machinery or components unless they are trained and qualified to do so.

iv. Comply with all pertinent lockout/tagout procedures and understand and adhere with all applicable safety and health rules and regulations.

4. DEFINITIONS

a. Qualified Persons - National Fire Protection Association (NFPA)70E defines a qualified person as one who has skills and knowledge related to the construction and operation of the electrical equipment and installation and has received safety training on the hazards involved. The key points of this definition are how knowledgeable workers are about the equipment and whether they have received safety training. In addition to helping to prevent accidents, both items are critical to designate a person as qualified and to avoid problems if OSHA performs an inspection.

i. OSHA (per 29 CFR 1926.32(m) defines "Qualified" as meaning one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems relating to the subject matter, the work, or the project.

ii. Specifically, Subpart S-Electrical identifies the qualified person as "one who has received training in and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved."

b. Unqualified Persons - NFPA 70E defines an unqualified person as simply "a person who is not a qualified person." There are two kinds of unqualified persons:

i. An unqualified electrician who does not know the equipment or has not received safety training on the potential hazards involved.

ii. A non-electrician, such as a general maintenance worker or painter, who is not expected to work on live electrical equipment.

c. **Authorized Persons** - Per 29 CFR 1926.32(d), "Authorized person" means a person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or locations at the jobsite. In other words, it is up to the employer to determine who is Authorized to perform specific tasks or be in specific areas. St. Norbert College Director of Facilities (or their designee) will determine which employees have the requisite knowledge, skills, PPE, etc. to perform work in that area safely.

This policy does not apply to work performed by qualified persons or to Lockout/Tagout procedures (see the Lockout/Tagout Safety Policy for additional information).

5. **PROCEDURES** - No employee at St. Norbert College shall conduct electrical work or repairs, open electrical panels, perform lockout or tagout procedures or attempt to repair electrical or machinery components unless they have been trained and are qualified to do so. Unless a trained and qualified employee is present at one of the St. Norbert College locations, electrical work shall be contracted out to an approved electrical vendor and/or contractor.

a. **General – Electrical Work**

i. Appropriate safety-related work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contact, when work is performed near or on equipment for circuits that are or may be energized. Those specific work practices shall be consistent with the nature and extent of the associated electrical hazards and within generally accepted industry standards.

ii. When other "affected employees" are in the area where electrical work is being conducted, appropriate safety-related work practices shall be employed to ensure that employees are protected from any potential safety hazards.

b. **General Electrical Hazards and Awareness** - All employees of St. Norbert College shall report any electrical hazards to their supervisors or managers immediately. Employees shall not touch or try to repair any electrical components that may be damaged unless trained and authorized to do so. The following are examples of basic electrical hazards that should be reported:

i. Damaged or frayed electrical cords

ii. Damaged plugs or plugs missing the ground (third) pin

iii. Plugs that have been intentionally or unintentionally squeezed together or separated

iv. Cords where the insulation has pulled away from the plug

v. Cords where the insulation is damaged or crushed from being driven over with a forklift or other vehicle or cart

vi. Cords that show evidence that they have been cut and spliced back together

vii. Cords or plugs that have electrical tape wrapped around them unless properly designed to cover damage

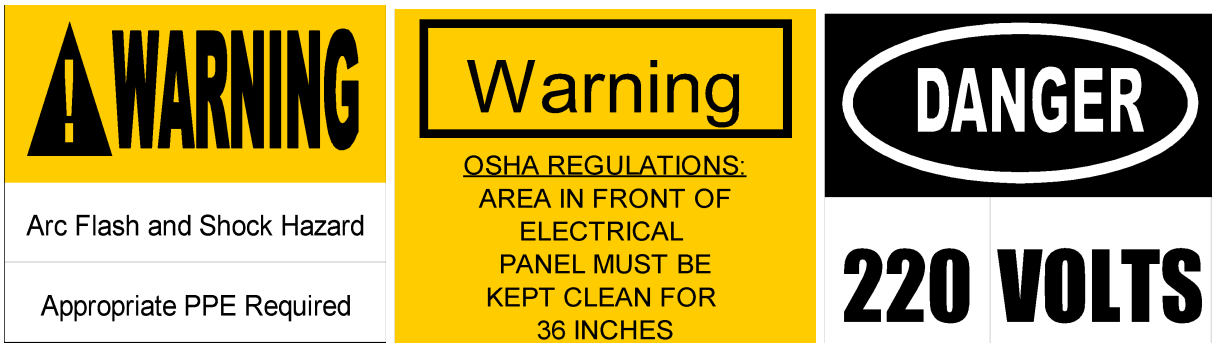
viii. Outlets that have cracked, damaged or missing cover plates

ix. Outlets that show signs of burning or scorching

x. Outlets that have damaged, cracked or missing plug inlets

xi. Electrical panel doors that are damaged, unable to be closed and/or are standing open

xii. Electrical panels that are not properly labeled with clearance labels, voltage, and arc flash warnings



c. **Work On or Near Exposed De-Energized Parts** - Live parts to which an employee may be exposed shall be de-energized before any employee works on or near them, unless de-energizing will cause additional or increased hazards or is infeasible due to equipment design or operational limitations. Live parts that operate at less than 50 volts to ground need not be de-energized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.

i. Whenever any employee is exposed to contact with parts of fixed electrical equipment or circuits that have been de-energized, the circuits energizing the parts shall be locked out, or tagged out, or both in accordance with the college's Lockout/Tagout Policy.

ii. Safe procedures for de-energizing circuits and equipment shall be determined before circuits or equipment are de-energized.

iii. The circuits and equipment to be worked on shall be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, may not be used as the sole means for de-energizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout/tagout procedures.

iv. Stored electric energy that might endanger personnel shall be released. Capacitors shall be discharged and high capacitance elements shall be short-circuited and grounded, if the stored electric energy might endanger personnel.

v. Stored non-electrical energy in devices that could re-energize electric circuit parts shall be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.

d. Work On or Near Energized Parts - In those cases where the exposed live parts are not de-energized, other safety-related work practices shall be used to protect employees who may be exposed to the electrical hazards involved. Such work practices shall protect employees against contact with energized circuit parts directly with any part of their body or indirectly through some other conductive object. The work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electrical conductors or circuit parts.

i. Only qualified persons may work on electric circuit parts or equipment that has not been de-energized.

ii. Such persons shall be capable of working safely on energized circuits and shall be familiar with the proper use of special precautionary techniques, personnel protective equipment, insulating and shielding materials, and insulated tools.

iii. Whenever work is to be performed near overhead lines, the lines shall be de-energized and grounded, or other protective measures shall be provided before work is started.

iv. When overhead lines are to be de-energized, arrangements to de-energize and ground them shall be made with the person or organization that operates or controls the electrical circuits involved.

v. When protective measures are provided, such as guarding, isolating, or insulating, those precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

vi. Whenever an unqualified person is working in an elevated position near overhead lines, the location shall be such that the person and the longest conductive object that the employee may contact, cannot come closer to any unguarded, energized overhead line than the following distances:

1. For voltages to ground 50kV or below – 10 feet

2. For voltages to ground over 50kV – 10 feet plus 4 inches for every 10 kV over 50 kV.

vii. Whenever an unqualified person is working on the ground in the vicinity of overhead lines, the person may not bring any conductive object closer to unguarded, energized overhead lines than the distance listed above.

viii. For voltages normally encountered with overhead power lines, objects, which do not have an insulation rating for the voltage involved, are considered to be conductive.

ix. Whenever a qualified person is working in the vicinity of overhead lines, whether in an elevated position or on the ground, the person may not approach or take any conductive object without an approved insulating handle closer to exposed

energized parts than that shown in Table S-5 of 29 CFR 1910.333 (c)(3) of paragraph 10.

x. The person is insulated from the energized part. Gloves with sleeves if necessary, rated for the voltage involved, are considered to be insulation of the person from the energized part on which work is performed.

xi. The energized part is insulated both from all other conductive objects at a different potential and from the person.

xii. The person is insulated from all conductive objects at a potential different from that of the energized part.

xiii. The minimum approach distances specified in the said Table S-5 are as follows:

VOLTAGE RANGE (Phase to Phase)	MINIMUM APPROACH DISTANCE
300V and less	Avoid Contact
Over 300V, not over 750V	1 ft. 0 in., (30.5 cm)
Over 750V, not over 2kV	1 ft. 6 in., (46 cm)
Over 2kV, not over 15kV	2 ft. 0 in., (61 cm)
Over 15kv, not over 37kV	3 ft. 0 in., (91 cm)
Over 37kV, not over 87.5kV	3 ft. 6 in., (107 cm)
Over 87kV, not over 121kV	4 ft. 0 in., (122 cm)
Over 121kV, not over 140kV	4 ft. 6 in., (137 cm)

xiv. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance of 10 ft. is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

xv. If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 ft. If the voltage is higher than 50 kV, the clearance shall be increased 4 inches for every 10kV over that voltage.

xvi. If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

xvii. If the equipment is an aerial lift insulated for the voltage involved, and if a qualified person performs the work, the clearance (between the un-insulated portion of the aerial lift and the power line) may be reduced to the distance given in Table S-5.

xviii. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

xix. The employee is using protective equipment rated for the voltage.

xx. The equipment is located so that no non-insulated part of its structure can come closer to the line than permitted in Table S-5.

xxi. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding shall not stand at the grounding location whenever there is a possibility of overhead line contact.

xxii. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents that can develop within the first few feet or more outward from the grounding point.

xxiii. Employees may not enter spaces containing exposed energized parts unless illumination is provided that enable the employees to perform the work safely. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees may not perform tasks near exposed energized parts.

xxiv. Employees must not reach blindly into areas that may contain energized parts.

xxv. Whenever an employee works in a confined or enclosed space that contains exposed energized parts, the employee must be provided with, and shall use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with those parts.

xxvi. Doors, hinged panels, and the like that are present in any confined or enclosed space shall be secured to prevent them from swinging into an employee and causing the employee to contact exposed energized parts.

xxvii. Conductive materials and equipment that are in contact with any part of an employee's body shall be handled in a manner that will prevent them from contacting exposed energized conductors or circuit parts.

xxviii. Whenever an employee must handle long dimensional conductive objects (such as ducts and pipes) in areas with exposed live parts, appropriate work practices (such as the use of insulation, guarding and material handling techniques) shall be instituted which will minimize the hazard.

xxix. Portable ladders shall have non conductive side rails if they are used where the employee or the ladder could contact exposed energized parts.

xxx. Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) may not be worn if they might contact exposed energized parts.

xxxi. Where live parts present an electrical contact hazard, employees may not perform housekeeping duties at such close distances to the parts that there is a possibility

of contact, unless adequate safeguards (such as insulating equipment or barriers) are provided.

xxxii. Electrically conductive cleaning materials (including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) may not be used in proximity to energized parts unless appropriate procedures are followed that will prevent electrical contact.

xxxiii. Only a qualified and authorized person following the requirements of the procedures set forth in this policy may defeat an electrical safety interlock and then only temporarily while the affected employee is working on the equipment.

xxxiv. The interlock system shall be returned to its operable condition when the work is completed.

e. Use of Portable Electric Equipment

i. All cord and plug connected electric equipment, flexible cord sets (extension cords), and portable electric equipment shall be handled in a manner that will not cause damage.

ii. Flexible electric cords connected to equipment may not be used for raising or lowering the equipment.

iii. Flexible cords may not be fastened with staples or otherwise hung in such a fashion as could damage the outer jacket on insulation.

iv. Portable cord and plug connected equipment and flexible cord sets (extension cords) shall be visually inspected before use on any shift for external defects (such as loose parts, deformed and missing pins, or damage to outer jacket or insulation) and for evidence of possible internal damage (such as pinched or crushed outer jacket). However, cord and plug connected equipment and flexible cord sets (extension cords), which remain connected and are put in place and are not exposed to damage, need not be visually inspected until they are relocated.

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

vi. Whenever an attachment plug is to be connected to a receptacle (including any on a cord set), the relationship of the plug and receptacle contacts shall first be checked to ensure that they are of proper mating configurations.

vii. A flexible cord used with grounding type equipment shall contain an equipment-grounding conductor.

viii. Attachment plugs and receptacles may not be connected or altered in a manner that would prevent proper continuity of the equipment-grounding conductor at the point where plugs are attached to receptacles. Additionally, those devices may not be altered to allow the grounding pole of a plug to be inserted into slots intended for connection to the current carrying conductors.

ix. Adapters that interrupt the continuity of the equipment grounding connection may not be used.

x. Portable electric equipment and flexible cords used in highly conductive work locations (such as those inundated with water or other conductive liquids, and conductive metals), or in job locations where employees are likely to contact water or conductive liquids, shall be approved for those locations.

xi. Employee's hands may not be wet when plugging and unplugging flexible cords and cord and plug connected equipment, if energized equipment is involved.

xii. Energized plug and receptacle connections may be handled only with insulating protective equipment if the condition of the connection could provide a conducting path to the employee's hand.

xiii. Locking type connectors shall be properly secured after connection.

f. **Electric Power and Lighting Circuits**

i. Load rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for routine opening, reversing, or closing circuits under load conditions.

ii. Cable connectors not of the load-break type, fuses, terminal lugs and cable splice connections may not be used for such purposes, except in an emergency.

iii. After a circuit is de-energized by a circuit protective device, the circuit may not be manually re-energized until it has been determined that the equipment and circuit can be safely energized. However, when it can be determined from the design of the circuit and the overcurrent devices involved that the automatic operating of a device was caused by an overload rather than a fault condition, no examination of the circuit or connected equipment is needed before the circuit is re-energized.

iv. Repetitive manual re-closing of circuit breakers or re-energizing circuits through replaced fuses is prohibited.

v. Over-current protection of circuits and conductors may not be modified, even on a temporary basis.

g. Test Instruments and Equipment

i. Only qualified persons may perform testing work on electric circuit equipment.

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

iii. Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected and shall be designed for the environment in which they will be used.

h. **Use of Flammable and Ignitable Materials**

i. In those situations where flammable materials are present, electric equipment capable of igniting them shall not be used, unless measures are taken to prevent hazardous conditions from developing.

ii. Such materials include, but are not limited to: flammable gases, vapors, or liquids, combustible dust, and ignitable fibers.

iii. In those situations where flammable vapors, liquids or gases, or combustible dusts or fibers are (or may be) present on a regular basis, the electrical installation requirements contained in the OSHA standard regulating hazardous (classified) locations must be observed.

iv. Employees working in areas where there are potential electrical hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed. Such equipment includes rubber protective equipment such as insulating gloves, blankets, hoods, line hose, sleeves, and matting for use around electric apparatus.

v. Protective equipment shall be maintained in a safe, reliable condition and shall be periodically inspected or tested.

vi. If the insulating capability of protective equipment may be subject to damage during use, the insulating material shall be protected.

vii. Employees shall wear nonconductive head protection wherever there is a danger of head injury from electric shock or burns due to contact with exposed energized parts.

viii. Employees shall wear protective equipment for eyes or face wherever there is danger or injury to the eyes or face from electric arcs or flashes or from flying objects resulting from electrical explosion.

ix. When working near exposed energized conductors or circuit parts, each employee shall use insulated tools or handling equipment, in case contact is made with such conductors or parts. If the insulating capability of insulated tools or handling equipment is subject to damage, the insulating material shall be protected.

x. Fuse handling equipment, insulated for the circuit voltage, shall be used to remove or install fuses when the fuse terminals are energized.

xi. Ropes and hand lines used near exposed energized parts shall be nonconductive.

xii. Protective shields, protective barriers, or insulating materials shall be used to protect each employee from shock, burns, or other electrically related injuries

while that employee is working near exposed energized parts which might be accidentally contacted or where dangerous electric heating or arcing might occur.

xiii. The following alerting techniques shall be used to warn and protect employees from hazards which could cause injury due to electric shock, burns, or failure of electric equipment parts:

1. Safety signs, safety symbols, or accident prevention tags shall be used where necessary to warn employees about electrical hazards, which may endanger them.

2. Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas exposing employees to non-insulated energized conductors or circuit parts. Conductive barricades may not be used where they might cause an electrical contact hazard.

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

4. When normally enclosed live parts are exposed for maintenance or repair, they shall be guarded to protect unqualified persons from contact with the live parts.

6. EMPLOYEE TRAINING

a. NFPA 70E, Article 110 outlines electrical safety-related work practices and procedures for people working on or near exposed, energized electrical equipment. The article states that it is the employer's responsibility to issue safety-related work practices and train employees to implement them.

b. NFPA 70E, Paragraph 100.6 specifies that employees who face the risk of electrical hazard must be trained. The paragraph states that it requires that these employees be trained to understand the specific hazards associated with electrical energy. This means they must be trained in safety-related work practices and requirements necessary to protect themselves from the electrical hazards associated with their jobs or tasks.

c. Workers must be trained to identify and understand the relationship between electrical hazards and possible injury. Further, people working on or near exposed, energized electrical conductors or circuit parts must be trained in methods to release victims from contact with exposed electrical circuits and in methods of first aid.

d. The training requirements apply to employees who face a risk of electric shock that is not reduced to a safe level by the electrical installation requirements. The training outline is as follows:

i. Safety-related work practices addressed in this policy.

ii. Requirements for unqualified persons.

iii. The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.

iv. The skills and techniques necessary to distinguish the nominal voltage of exposed live parts.

v. The clearance distances and the corresponding voltages to which a qualified person will be exposed.

vi. The training required shall be of the classroom or on-the-job type. The degree of training provided shall be determined by the risk of the employee.

7. **POLICY REVIEW AND UPDATE** - This policy shall be reviewed and updated on an annual basis or sooner if necessary.

Date	Update or Revision	By Whom
02/8/2018	Initial Policy Creation and Input	P. Wrenn, R. Gerbers, D. Splan, and M. Eddy
6/22/2018	Updates applied per E. Jahnke	M. Eddy