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	SIGNATURE	DATE
<i>ADOPTED FROM AER DOCUMENT #</i>	507763-000-0000-68AG-0017	_____
<i>REVIEWED BY:</i> Shelley Cox	_____	_____
<i>APPROVED BY:</i> Darren Toner	_____	_____

ISSUE/REVISION INDEX

Issue Code	Revision					Revision Details
	No.	By	Rev'd.	App.	Date	
RR	PA	SLI	SC	DT	2020-05-08	Originate date of creation

Issue Codes: RC = Released for Execution, RD = Released for Design, RF = Released for Fabrication, RI = Released for Information, RP = Released for Purchase, RPA = Released for Permit Application, RQ = Released for Quotation, RR = Released for Review and Comments.



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1.0 PURPOSE & SCOPE

This Work Instruction details safe work standards to be used with certain types of tools and equipment. It applies to all employees, and to all contractors and visitors working on a North Atlantic Project (NAPG) site. The scope of this instruction is to establish the minimum requirements, measures and actions to be taken for a NAPG project site.

2.0 ELECTRIC POWER TOOLS

2.1 General Requirements for Electric Power Tools

All power tools shall be CSA approved. All portable electric tools must be grounded (3-wire) or double insulated. Electrical tools shall not have a lock-on (trigger lock) mechanism.

Electrical tools and cables must be covered or elevated to protect them from damage and to eliminate tripping hazards.

Under no circumstances will power tools be handled / lowered by their cords. A hand line or bucket shall be used.

When using power tools, it is important to read and follow manufacturers' specifications. All dangerous moving parts of electric tools shall be enclosed, shielded or guarded as per manufacturer recommendations. Guards and other safety devices **must not** be modified, tampered with, or removed.

Cutting or abrasive attachments such as blades, disks or bits shall be the proper size and rating for the power tool used, and appropriate for the type of work being done.


Never force or put pressure on power tools; let the tool do the work. Applying too much pressure may cause the blade, disk or bit to fail.

Always disconnect the tool from the power source when adjusting or changing attachments. Switching off the tool may not be enough to prevent unintentional start-up.

Power tools shall be removed from receptacles by removing the plug, not pulling on the cord.

Power tools must be held firmly, and material must be properly secured before turning on and starting work. Always use handles provided to help control the tool and avoid twisting.

All power tools must be inspected prior to each use in addition to the NAPG Project specific quarterly inspection requirements. Make sure the casings of double-insulated tools are not cracked or broken.

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Verify that all electrical equipment is “approved” with recognized approval markings to ensure they meet the electrical safety requirements for Ontario – See Appendix A.

Electrical equipment that is plugged into a power source should **NEVER be** handled if your hands or feet are wet.

All electrical circuit disconnects, or panels must not be blocked.

Know the manufacturer’s recommended limits on the use of the electrical product and follow those recommendations precisely. These limits may be found on written instructions that accompany the electrical product or on a sticker or tag affixed to the electrical tool, extension cord, etc.

Do not use any equipment without proper approval from your supervisor.

Do not store flammable liquids near electrical equipment.

All power tools must be plugged into a power outlet with a Ground Fault Circuit Interrupter (GFCI).

Use hand tools with insulated handles and grips.

Wear Appropriate PPE for task, as per manufacturer instructions and project procedures.

Do not hold water pipes or other grounded conductors when using electric tools. A defect in tool or cord will make you part of the circuit causing shock, a fall off your ladder, or electrocution.

Before drilling, hammering or cutting with hand or power tools, check for electrical wires or equipment behind walls, above ceilings, and under floors.


Never by-pass broken switches on tools or equipment by plugging and unplugging the cord

Any shock or tingle, no matter how slight, means that the tool or equipment should be checked and replaced if necessary. All electrical shocks must be reported.


Never use metal or metal-reinforced ladders near live wires or equipment. Use non-conductive ladders.

2.2 Power Cords:

Before utilizing electrical cords, the following practices must be reviewed and followed:

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- a) Electrical cords must be in good condition. All damaged cords, plugs or switches must be taken out of service, tagged "DO NOT OPERATE" and repaired immediately by a qualified electrician or removed from site.
- b) Extension cords must be three-pronged and appropriately sized for the intended load. Electrical cords should not be smaller than AWG#18 for up to 25'0" long extension cords and not smaller than AWG#12 for up to 100'0" long extension cords. A qualified authorized electrician can confirm the actual AWG.
 - i. Ensure that the chosen electrical extension cord thickness is the same size or bigger than the electrical cord for the tool.
- c) Never cut off, bend back or cheat the ground pin on three prong plugs.
 - i. Never use a three prong plug when the ground pin is missing.
- d) Use polarized plugs (one large or wide prong and one narrow one). This ensures that the plug is inserted correctly in a socket for proper flow of electrical current, but more importantly, eliminates the potential for shock due to reversed polarity.
- e) Always inspect the power cord to ensure there are no split insulating coverings, or bare wires, or loose prongs, or heat excessively when in use.
- f) Never use any power cord with damaged plug or receptacle ends.
- g) Always use the proper size and gauge power cord for the tool or equipment to prevent overheating, voltage drops or tool burnout.
- h) Never overload extension cords. The extension cord's rating capacity (measured in AMPS) is labeled on the cord. For example:
 - i. Always check the manufacturer's manual.
- i) Extension cords should not be connected in series – this will lead to overloading the extension cord
- j) Never use any power cord with damaged plug or receptacle ends.
- k) Ensure the rating on the cord is the same as or higher than the number of watts needed by the product that will be plugged into the cord
- l) **Never** pull on any power cord to lower a tool or a piece of equipment


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- m) Always inspect the area where a power cord is to be used and ensure no contact with pooling water.
- n) Keep cords out of the path of electric tools and equipment.
- o) Electrical and extension cords must not be coiled or looped when in use.
- p) If the tool being used activates the electrical protection devise (fuse, breaker), remove the tool and extension cord out of service, tag the units as “out of service” and have the system (tool, cords, outlet, electrical protection) checked by qualified personnel.
- q) Never attempt to rewire any power cord unless trained and competent to do so. Always use qualified personnel for any electrical repair.
- r) Never place cords under carpets, over or through doorways, windows or in path of travel (avoid tripping hazards). Use truck-track covers to cover electrical cords whenever exposed to worker or equipment paths of travel.
- s) Use electrical cords fitted with dead front plugs, this presents less risk of electrical shock and short circuits as compared to open front plugs.
- t) Do not tie cord plugs to outlets.
- u) Do not allow cables and plugs to get wet. Thus, keep liquids away from electrical equipment.
- v) Electrical cords must be in good working condition before usage.
- w) Most manufacturer’s recommend storing extension cords in an interior location at a temperature greater than 0°C to prevent deterioration.


3.0 POWER BARS / POWER STRIPS – WITH OR WITHOUT SURGE PROTECTION

Surge protectors, power strips / power bars, or extension cords are not a substitute for permanent wiring. When using power bars, also referred to as power strips, it is important to follow the manufacturer’s instructions.

- a) Use a UL or CSA approved power bars.
- b) Use only surge protectors or power strips that have an internal circuit breaker. These units will trip the breaker if the power strip is over loaded or shorted to prevent overheating.
- c) Manufacturers typically recommend that power bars should only be used for computers, audio and video equipment and low amperage office equipment.

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- d) Do not use power bars in an area where the unit would be covered with carpet, furniture, clothing or any other items that will limit or prevent air circulation.
- e) Do not use power bars in an area where they will be exposed to moisture.
- f) Each power bar electrical cord should be plugged directly into a structurally mounted electrical receptacle and should not be chained together (daisy chained power bars result in overloading circuits and fires) or fed from another extension cord.
- g) Manufacturers typically recommend that only be one surge protector or power bar plugged into a single duplex electrical outlet.
- h) Ground pins on the plugs and the devices plugged into the receptacles must be intact and not damaged or lose.
- i) Power bars must be free of cracks, splits, fraying and other damage because of general wear and tear.
- j) f the power bar experiences a fault, manufacturers recommend that it should be tested by qualified authorized electrician prior to placing the device back into service.
- k) If at any time the surge protector / power bar or plug strip is hot to the touch, remove and replace the unit immediately

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3.1 Colour Coding

Upon passing an inspection, tools/equipment will be documented, and colour coded. Colour coding can be done with tape being wrapped around a part of the item at an obvious location. The yearly colour codes are as follow:


January to March - Blue
 April to June – Green
 July to September - Yellow
 October to December – White

Colours will be posted at the tool cribs for the current quarter. **Two weeks** before the end of the current quarter, the next quarter’s colour code will be posted with the current one and a notice will be issued in the weekly tool box meeting to advise of the new colour code and inspection requirement. This two-week lead period will allow for the gradual return of tools/equipment and avoid problems with inspection of large quantities and last-minute returns. During this period both colour codes will be valid. This applies to Electrical equipment such as cords, electrical tools and GFCI's

4.0 PNEUMATIC TOOLS AND COMPRESSED AIR.

4.1 General Requirements for Pneumatic Tools


- a) Hose couplings for use with pneumatic tools shall not be compatible with those used for breathing air.
- b) All pneumatic tools must be inspected prior to each use in addition to the NAPG Project or Project specific quarterly inspection requirements.
- c) Keep hands away from the bit, cutting or discharge ends.
- d) Prior to connecting the tool to the hose, the hose should be pointed in a safe direction and blown out to remove moisture and dirt.
- e) Before changing tools, the pressure should be turned off and the hose pressure removed through use of the tool. Hoses should not be kinked to stop airflow.
- f) Always turn off the air pressure when not in use.
- g) Air tools are often associated with a high degree of vibration and should be equipped with anti-vibration grips where possible.
- h) Operating triggers on portable pneumatic tools shall be:
 - i. placed to minimize the risk of unintentional starting of the tool; and
 - ii. so, arranged as to close the air inlet valve automatically when the pressure of the operator’s hand is removed.
- i) Hose and hose connections for compressed-air supply to portable pneumatic tools shall be:
 - i. designed for the pressure and service for which they are intended; and

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- ii. Fastened securely to the pipe outlet and *equipped with a hose whip check*, as appropriate.
- j) Pneumatic shock tools shall be equipped with retainers to prevent dies and tools from being unintentionally expelled from the barrel.
- k) Pneumatic tools shall be disconnected from power and the pressure in hose lines released before any adjustments or repairs are made.

4.2 General Requirements for Compressed Air

- a) Automatic excess flow valves shall be installed on all airlines at the compressor or header to prevent whipping of the line in the event of a failure. This is especially critical in congested areas.
- b) Form work and concrete slabs shall only be blown free of debris when personnel are not present, and a specific JHA for task shall be completed and approved prior to task.
- c) Air compressors shall be run in well-ventilated areas.
- d) Compressed air shall not be used to blow dust off clothing.
- e) All personnel working or potentially working with compressed air or liquid must be trained in High Pressure Injection Injury awareness. All training must be documented.
- f) Any suspected high-pressure line leaks must ONLY be inspected or repaired by certified personnel with the appropriate PPE (Personal Protective Equipment) and tools.
- g) Compressors and Pneumatic Tools shall be examined, tested and issued with a certificate by a competent person in cases and at times prescribed by manufacturer codes, acts or regulations.
- h) Compressors shall be equipped with:
 - i. automatic devices that will prevent the maximum safe discharge pressure from being exceeded; and
 - ii. a quick-release valve.
- i) Suitable arrangements shall be in place for preventing contamination from entering confined spaces the use of compressed air where persons are working in such spaces.
- j) Compressors in which explosive mixtures of gas may form shall be protected against sparking.
- k) Where compressor cylinders are equipped with water-cooling jackets it shall be possible to observe the water flow.
- l) Intercoolers and after coolers shall be able to withstand safely the maximum pressure in the air-discharge piping
- m) Where necessary to prevent danger, air-discharge piping of compressors shall be provided with:
 - i. a fusible plug;
 - ii. Insulating covers to protect workers against burns, and to prevent fire risks.
- n) Where stop valves are installed in air-discharge piping:
 - i. they shall be easily accessible for inspection and cleaning;


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- ii. One or more safety valves shall be installed between the compressor and the stop valve.
- o) Air receivers shall be equipped with
 - i. a pressure relief valve;
 - ii. a pressure gauge;
 - iii. a drain petcock.
- p) Air receivers shall be provided with suitable openings for inspection and cleaning.
- q) The safe working pressure shall be marked in a distinctive color on the pressure gauge.
- r) Where necessary to prevent danger, a pressure-reducing valve or a stop valve, or both, shall be inserted in the piping between the air receiver and the compressor.
- s) Between the receiver and consuming equipment, there shall be a stop valve.

5.0 PEDESTAL, BENCH AND PORTABLE GRINDERS

5.1 General Requirements

- a) Wheel rating must meet or exceed the maximum potential RPM of the grinder on which it is mounted.
- b) Special adapters, arbors, or other improvisations are not permitted, nor may more than one wheel be mounted between a single set of flanges.
- c) All abrasive wheels shall be mounted between flanges which are at least 1/3 the diameter of the wheel.
- d) On all portable tools, the control switch shall be instant-pressure controlled without a locking pin.
- e) Guards must be installed and maintained.
- f) The proper respiratory protection shall be used in the event dust hazards exist.
- g) The proper eye/face and hand protection shall be used.
- h) Guards, work rests, eye shields, and other permanent protection devices **must not** be removed from any grinding or buffing wheels


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5.2 Pedestal and Bench Grinders.

- a) The using department shall be responsible for installing all wheels and determining that they are designed for the speed of the grinder.
- b) Grinding is not to be performed on the side of the wheel.
- c) The operator should stand aside and allow the wheel to run idle a full minute before starting to grind.
- d) Dress the wheel if it is out of true.
- e) Grinding must not be forced.

5.3 Portable Grinders

- a) Departments using portable grinders will change wheels when necessary. Only wheels of RPM rating above that of the grinders are to be used.
- b) Handles must always remain attached.
- c) **WARNING:** All shirts must be tucked in to trousers when using grinders.
- d) Using the Wire Brush Wheel:
 - i. The work piece should be held at horizontal center of the brush.
 - ii. The wire tips should do the work. Forcing work into the brush results in no increase in cutting action, an increase in wire breakage and/or tendency for work to become snagged.
 - iii. Small pieces being brushed should be held in a simple jig or fixture which will prevent the operator's hand from contacting the surface of the brush.
 - iv. A straight, heavy steel rod or bar should be used to clean the wheels.

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6.0 WELDING EQUIPMENT

6.1 General Hot work and Welding Requirements


- a) A Hot Work Permit shall be obtained before commencing any hot work.
- b) Prior to starting work, fire protection shall be stationed, inspected, and on hand in the immediate vicinity of all hot work.
- c) The work area shall be checked for flammable and combustible materials prior to starting work.
- d) Spark and slag shall be contained as much as possible with fire blankets or similar devices. Where sparks cannot be contained and there is a possibility of contact with combustibles, Fire watches shall be used. Care shall be taken to warn personnel in the area if sparks or slag creates a hazard.
- e) When it is necessary to weld or burn overhead, a Fire Watch person will be required in addition to using a fire blanket, barricades or warning signs.
- f) Welding screens shall be installed to protect personnel from exposure to the arc.
- g) Welding shall be carried out in well-ventilated areas whenever possible. Mechanical ventilation shall be used in areas of poor ventilation.
- h) Welding and cutting shall never be performed on barrels, tanks, piping, or other systems that may have contained combustible or unknown products and have not been cleaned and purged.

6.2 Storage of Compressed Gas Cylinders

- a) All oxygen/acetylene cylinders shall be capped when not in use and shall be stored and transported in such a manner as to prevent personal injury or property loss. Cylinders shall be transported in a secured upright position to prevent uncontrolled movement or damage.
- b) Cylinders shall be mounted on mobile carts designed for this purpose when being used or moved. When cylinders are lifted by hoisting equipment, a basket,

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- c) cradle or similar approved handling device must be used. Slings or magnets will not be allowed.
- d) Platforms shall be used to store full and empty cylinders and each cylinder shall be marked "full" or "empty". Empty cylinders shall be returned to the platform and secured.
- e) Cylinders shall be secured using a minimum of 1/4" steel chain. Rope is not permitted.
- f) Valve Damage – Cylinders containing compressed gas which are in storage shall be protected against valve damage.
- g) Where compressed gas cylinders are designed to accept protective caps, the user shall always keep such caps on compressed gas cylinders except when being filled or connected for use.
- h) Where gastight valve outlet caps or plugs are provided, the user shall always keep such devices on the valve outlet except when compresses gas cylinders are being filled or connected for use.
- i) Temperature limitations – Cylinders containing compressed gas shall be stored in areas where the ambient air temperature does not exceed 52°C.
- j) Note: In some zones of the project sites, particularly in hot metal areas, compressed gas cylinders **are not permitted**.
- k) Compressed gas cylinders shall be placed so they are not in contact with falling sparks or slag.
- l) All gas cylinders shall be clearly identified according to Canadian WHMIS Regulations.
- m) Incompatible gasses or Flammable and non-flammable (or other fuel gas) cylinders in storage must be separated from each other by 6 meters or by a 2-meter barrier that has a one-hour fire rating.

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- n) Where cylinders containing compressed gas are stored indoors, the storage areas or rooms shall be dry and well ventilated.
- o) Signs – Storage rooms shall have exterior signs with a minimum 50 mm high letters indicating the nature of the compressed gasses.
- p) Compressed gas cylinders must not be stored in a corrosive atmosphere.
- q) Floors of storage areas shall be of non-combustible construction.
- r) Signs prohibiting smoking or open flames within 6.1 m shall be provided in areas where compressed gases are produced, handled, stored, or used.
- s) For Additional requirements for storage of quantities >25kg see Vale SPI SAF – 15

6.3 Outside Storage

- a) Where cylinders containing compressed gas are stored outdoors, they shall be supported on raised concrete or other non-combustible material platforms protected from the weather by a non-combustible canopy in an enclosure surrounded by a firmly anchored fence and used for the sole purpose of such storage. The fence is to be designed to discourage climbing, be constructed to a minimum height of 1.8m, and be equipped with a gate, and kept locked when the enclosure is not staffed.
- b) Cylinders containing compressed gas and located outdoors shall maintain the following clearances from building openings:
 - i. At least 1.5m from any building opening if the aggregate capacity of expanded gas is not more than 170cu m.
 - ii. At least 7.5m from any building opening if the aggregate capacity of expanded gas is over 170cu.m. but less than 500 cu m.
 - iii. At least 15 m from any building opening if the aggregate capacity of expanded gas is greater than 500 cu m.
- c) Where a crescent wrench or other special wrench is required to operate a cylinder valve, the wrench must be kept in position on the valve. Oily rags, WD-40 or other oil based products shall not be used to lubricate caps, valves, or gauges.
- d) All oxygen and acetylene regulators and torches **must have** a flashback arrestor on both, and clamped in accordance to CSA, Ontario OH&S Regulations & manufacturer's instructions.

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- e) All hoses will be inspected prior to each use and flashback arrestors will be utilized at the torch and regulator.
- f) Additional requirements for Acetylene cylinders:
 - i. Except when being transported, acetylene cylinders shall be kept in an upright position
- g) Additional requirements for Oxygen cylinders:
 - i. Oil or grease shall not be used for the lubrication of valves and fittings on oxygen cylinders.

6.4 Cables


- a) All welding work shall have a separate and proper ground. The ground shall be located as close as possible to the work. Grounds shall not be attached to rotating equipment, stems of valves, or other equipment where a short could damage the equipment.
- b) Welding cables shall be placed in a manner that does not create a tripping hazard. Cables shall be protected from mechanical damage at road crossings, sharp corners, slag and gouging, etc.
- c) Welding cables are not to be laid across or along unprotected cable trays.

6.5 Portable Welders

- a) When transporting portable welders ensure cables are secured, wound and attached, and the machine is properly secured to the transporting unit.
- b) Portable welding machines shall be turned off while refueling. Fuel tanks should not be "topped off" to full capacity. This will prevent leakage from expansion.

6.5.1 Grounding Portable Welders

- a) Provide a ground to the earth for your portable welders. The ground strap to the frame is for bonding purposes and is not a ground to earth.


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Provide a ground to the earth for your portable welders. The ground strap to the frame is for bonding purposes and is not a ground to earth.

7.0 CHAIN SAWS


7.1 Instructions

- a) Chainsaws must comply with the CSA Standard Z.62.1-95 “Chain Saws”.
- b) Operate and maintain chainsaws in accordance with manufacturer’s specifications. Review these requirements prior to operation.
- c) Make sure only trained and experienced personnel operate chainsaws. On job training requirements, including a demonstration of proficiency must be conducted by an experienced individual.
- d) Training records to be kept and maintained.
- e) When carrying and transporting chainsaws, shut off the motor, engage the chain brake and put the chain bar guard in place.
- f) Keep chains sharp, well lubricated and properly tensioned.
- g) Chainsaws are intended only to cut wood. Do not use on other material. Take care to avoid contact with nails or other metallic objects.
- h) Fuel and utilize chainsaws in well-ventilated areas only. Do not fuel with the motor running or while the saw is hot. Always allow for a cool down period. Always fuel chainsaws over-top of spill pads to contain potential fuel product release.
- i) Make sure chainsaws are equipped with chain brakes and “anti-kickback” bars. Some chainsaws are
- j) equipped with a hand guard that looks like a chain brake. A chain brake will not stop the chain in the event of a kickback. Before use, test chain brakes to make certain they are functioning properly. The recommended chainsaw personal protective equipment includes:
 - i. Hard hat, reflective vests, and 8” protective footwear, complete with steel toe and metatarsal guard;
 - ii. Tight fitting protective eyewear (smoggles) and face shield;
 - iii. Hearing protection muffs that are Class A recommended, to protect against 80 dBA noise levels;
 - iv. Chainsaw pants or chaps; and
 - v. Leather gloves.
- k) Do not use chainsaws off ladders, scaffolds or other work platforms to reach the work. Do not use chainsaws above shoulder height.

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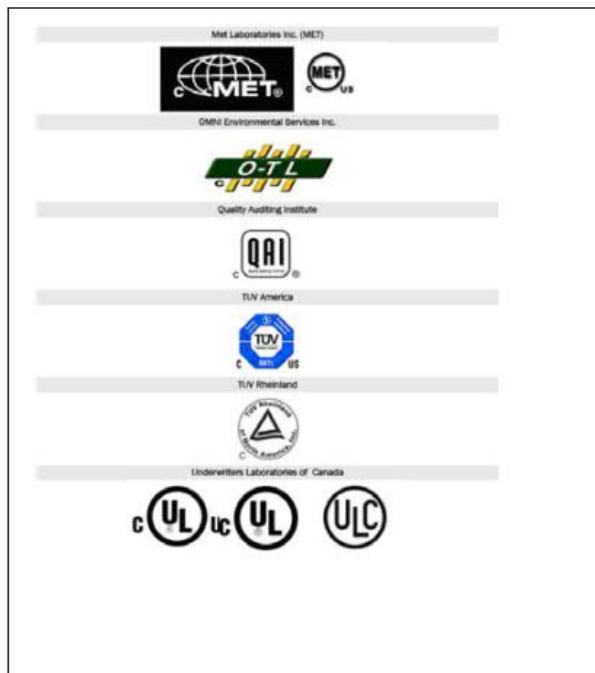
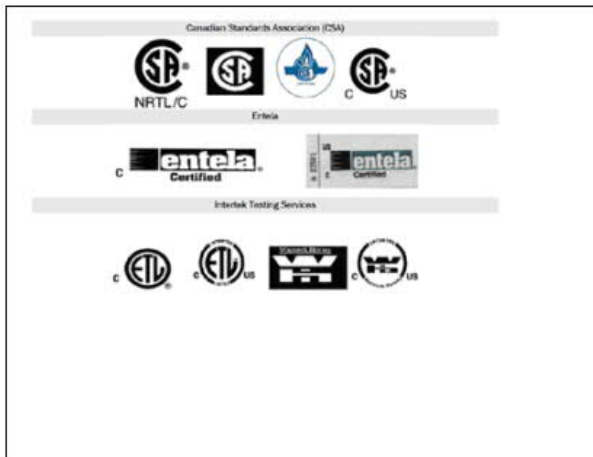
8.0 REFERENCE


NAPG-SAF-SPI-00005	NAPG H&S policy
NAPG-RA-SPI-00001	Job Hazard Assessment Procedure:
NAPG-SAF-SPI-0014	Electrical Safety:
NAPG-OH-SPI-0001	WHMIS controlled products
NAPG-SAF-SPI-0028	Hot Work Procedure
NAPG-SAF-SPI-0007	Personal Protective Equipment:

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9.0 APPENDIX A

The following are recognized electrical certification marks acceptable under the Ontario Electrical Safety Code


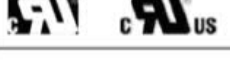


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The following are the acceptable field evaluation marks under the Electrical Safety Code

FIELD EVALUATION MARKS ACCEPTABLE UNDER THE ELECTRICAL SAFETY CODE	
CANADIAN STANDARDS ASSOCIATION (CSA)	
ELECTRICAL SAFETY AUTHORITY (ESA)	
ENTALA	
ENTALA TESTING SERVICES	
ONTARIO HYDRO (OH)	
QUALITY ASSURANCE INSTITUTE (QAI)	
TÜV RHO AND (TV)	
UNDERWRITERS LABORATORIES OF CANADA (ULC)	

Component Marks acceptable under the Electrical Safety Code which are specifically used on component parts that are part of a larger system or part of a larger product.

Component Marks Acceptable under the Electrical Safety Code which are specifically used on component parts that are part of a larger product or system	
Canadian Standards Association (CSA)	
Underwriters Laboratories Inc. (UL)	

DOCUMENT END

	General Power Tool Safety NAPG-SAF-SPI-0025		Revision	
			#	Date
	Report No (DM#): 1429634		00	2020-05-08
		Review 2 year		
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