1. Definitions, Acronyms

This list of acronyms and definitions supplements those already provided in the Electrical Safety Qualified Program (ESQP); notwithstanding some duplication that may be provided for convenience. In the event of conflict between this Appendix and the ESQP, the explanation provided in the ESQP shall govern.

2. Acronyms

AED	Automatic external defibrillator
AFB	Arc Flash Boundary
AFCI	Arc Fault Circuit Interrupter
AFHA	Arc Flash Hazard Analysis
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
APC	Arc-flash PPE Category (Replaced HRC)
AR	Arc Rating
ASTM	American Society for Testing and Materials
ATPV	Arc Thermal Performance Value (For arc-rating Clothing)
CEC	Canadian Electric Code, Part 1, C22.1
CMMS	Computerized Maintenance Management System
CSA	Canadian Standards Association
CSA Z462	CSA standard for Workplace Electrical Safety
E_B	Incident Energy at the distance of the arc flash boundary, cal/cm^2
E_I	Incident Energy, cal/cm^2
E_{MA}	Incident Energy, maximum open arc, cal/cm^2
E_{MB}	Incident Energy, maximum 508 mm (20 in) cubic box, cal/cm^2
E_n	Incident Energy, normalized for time and distance, cal/cm^2
EJHA	Electrical Job Hazard Analysis
EEWP	Energized Electrical Work Permit
EHS	Environmental, Health, and Safety
ESPQ	Electrical Safety Qualified Program
ESW	Electrical Safety Watch / Standby Person
ESWP	Electrical Safe Work Procedure
FR	Flame Resistant
FLHA	Field Level Hazard Assessment
GFCI	Ground Fault Circuit Interrupter
HSE	Health, Safety and Environment
HV	High Voltage
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
LV	Low Voltage
MCC	Motor Control Center
MSHA	Mine Safety and Health Administration
MOC	Management of Change

NEC National Electrical Code (NFPA 70)
NESC National Electrical Safety Code (IEEE)
NETA International Electrical Testing Association
NEW Non Electrical Worker
NFPA National Fire Protection Association
NIOSH National Institute of Occupational Safety and Health
NSMS National Safety Management Society
OCPD Overcurrent Protective Device
OSHA Occupational Safety and Health Administration
OH&S Occupational Health and Safety
OHSAS Occupational Health and Safety Advisory Services
PM Preventative Maintenance
PPE Personal Protective Equipment
QEW Qualified Electrical Worker (Mosaic)
QOW Qualified Operations Worker
SLD Single Line Diagram or One Line Diagram
TPG Temporary Protective Ground
TQW Task Qualified Worker
UL Underwriters Laboratories
ULC Underwriters Laboratories of Canada
WHA Worksite Hazard Assessment

3. Definitions

Abnormal Operation: See *Normal Operation*. When equipment is**:**

a) Not properly Installed,
b) Not properly Maintained,
c) Doors are open or not secured,
d) Covers are in off or not secured, or
e) There is evidence of impending failure (e.g. – temperature, smoke, etc.)

Approved Electrical & Electrical Test Equipment: Is tested and certified to the applicable CSA (Canada) or UL (USA) standards and must bear a CSA (Canada) or UL (USA) label or a label of a certification testing body accredited by the authority having jurisdiction.

Arc Blast: An arc blast is associated with the release of pressure as a result of arcing fault current and typically an arc fault event. Dangers associated with an arc blast event are high air pressures, sound and shrapnel.

Arc Flash: Electrical equipment that faults due to an abnormal condition and creates an arcing fault and arc flash. Can expose a worker to extreme heat causing severe burns.

Arcing Fault Current: A fault current flowing through an electrical arc plasma, also called arc fault current or arc current.

Arc Flash Hazard: A dangerous condition associated with the release of energy caused by an electric arc.

An arc flash hazard can exist when either energized electrical conductors or circuit parts are exposed or are within equipment in a guarded or enclosed condition if a person is interacting with the equipment in a manner that could cause an electric arc. Under normal operating conditions, enclosed energized equipment that has been properly installed and maintained is not likely to pose an arc flash hazard.

Arc Flash Hazard Analysis (AFHA): An engineering study investigating a worker's potential exposure to arc flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, Arc Flash Boundary (AFB), and the appropriate levels of personal protective equipment.

Arc Flash Boundary (AFB): See *Boundary, Arc Flash.*

Arc Flash PPE Category (APC): (Replaces the Hazard Risk Categories HRC). A method of completing an arc flash hazard analysis that uses electrical equipment

type, voltage, and energized work task descriptions with an associated maximum fault current and clearing time to determine arc flash protective clothing requirements. In using this arc flash hazard analysis method the user must comply with all notes in the body of CSA Z462 or NFPA 70E and the notes associated with the Tables provided. Arc flash protective clothing CANNOT be specified by an APC value unless the APC Table Method of arc flash hazard analysis was used in determining what arc flash protective clothing is required.

Arc Flash Suit: A complete arc rated PPE clothing system that covers the entire body except for the hands and feet. It includes pants, a jacket, and a bee-keeper-type hood fitted with a face shield. It is recommended that the hood includes an integral cooling fan.

Arc Rating (AR): The value attributed to materials that describes their performance on exposure to an electrical arc discharge. The arc rating is expressed in cal/cm^2 or joules/cm^2 and is derived from the determined value of the Arc Thermal Performance Value (ATPV) or energy of breakopen threshold (E_{BT}) (if a material system exhibits a breakopen response below the ATPV value).

Arc Resistant Switchgear: See ***Error! Reference source not found.***.

Arc Thermal Performance Value (ATPV): Defined in ASTM F1959 as the incident energy on a material or a multilayer system of materials that results in 50% probability that sufficient heat transfer through the tested specimen is predicted to cause the onset of a second degree skin burn injury based on the Stoll curve.

Authorized Person: A qualified person who, in his or her duties or occupation, is obliged to approach or handle electrical equipment; or a person who, having been warned of the hazards involved, has been instructed or authorized to do so by someone having authority to give the instruction or authorization.

Balaclava (sock hood): An arc-rated flame-resistant hood that protects the neck and head, except for the area of the eyes and nose.

Barricade: A physical obstruction, intended to provide a warning about and to limit access to a hazardous area.

Barrier: A physical obstruction that is intended to prevent contact with equipment or energized electrical conductors and circuit parts, or to prevent unauthorized access to a work area.

Blind Reaching: Placing a body part, usually a hand or finger, into an area that is not directly visible or not visible due to inadequate lighting.

Bolted Fault Current: A short circuit or electrical contact between two conductors at different potentials in which the impedance or resistance between the conductors is essentially zero.

Boundary, Arc Flash (AFB): When an arc flash hazard exists, an approach limit at a distance from energized electrical conductors or circuit parts within which a person could receive a second degree burn (e.g. 1.2 cal/cm^2 or 5.0 joules/cm^2 of incident energy exposure).

Boundary, Limited Approach (Shock): An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.

Boundary, Restricted Approach (Shock): An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.

Breakopen: In electric arc testing, a material response evidenced by the formation of one or more holes in the material which may allow thermal energy to pass through the material. Breakopen is defined as a hole with an area of 0.5 in^2 or an opening with a 1.0 in dimension in any direction.

Competent Worker: Based on validation a worker who has suitable qualifications, training, knowledge, and experience to undertake specific work tasks.

De-energized: Free from any electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth.

Disconnect Switch: See ***Error! Reference source not found.*** and ***Error! Reference source not found.***.

Due Diligence: Is the level of judgement, care, prudence, determination, and activity that a person would *reasonably* be expected to exercise under particular circumstances. Applied to occupational health and safety, due diligence means that employers shall take all reasonable precautions, under the particular circumstances, to prevent injuries or accidents in the workplace. This duty also

applies to situations that are not addressed elsewhere in the occupational health and safety legislation. To exercise due diligence as it pertains to the ESP, Mosaic must implement a plan to identify possible workplace electrical hazards and carry out the appropriate corrective action to prevent accidents or injuries arising from these hazards.

Electrical Equipment: Any apparatus, appliance, device, instrument, fitting, fixture, luminaire, machinery, material, or thing used in or for, or capable of being used in or for, the generation, transformation, transmission, distribution, supply, or utilization of electric power or energy, and, without restricting the generality of the foregoing, includes any assemblage or combination of materials or things that is used, or is capable of being used or adapted, to serve or perform any particular purpose or function when connected to an electrical installation, notwithstanding that any of such materials or things may be mechanical, metallic, or non-electric in origin.

Electrical Hazard: A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

Electrical Protective Device: See ***Error! Reference source not found.***.

Electrical Protective Relay: See ***Error! Reference source not found.*** *and* ***Error! Reference source not found.***.

Electrical Safety: Recognizing hazards associated with the use of electrical energy and taking precautions so that such hazards do not cause injury or death.

Electrical Work: See also **Working On**. The construction, installation, alteration, repair or maintenance of electrical equipment or devices. (see operate)

Electrically Safe Work Condition: A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked out in accordance with established standards, tested to ensure the absence of voltage, and grounded (if grounding is determined to be necessary).

Electrical Switching Plan: An electrical switching plan is intended to provide a detailed sequence of steps when operating multiple electrical devices such as disconnect switches or circuit breakers in a particular order for the purpose of isolating a source(s) or energizing a load(s).

Energized: Electrically connected to or having a source of voltage.

Energized Electrical Work: See **Working On**.

Energy-isolating Device: a lockable mechanical device that physically prevents the transmission or release of energy, including, but not limited to, the following**:**

a) a manually operated electrical circuit breaker;
f) a disconnect switch;
g) a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors;

Exposed: (as applied to energized electrical conductors or circuit parts) Capable of being inadvertently touched or approached nearer than a safe distance by a person. This term is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.

Fault: In an electric power system, a fault is any abnormal electric current or release of electrical energy.

Fault Current: The amount of current delivered at a point on the system during a short circuit condition.

Fault Current, Available: The largest amount of current capable of being delivered at a point on the system during a short-circuit condition.

Flame Resistant (FR): The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source.

Grounded: Application of an intentional connection between earth ground and normally energized circuit parts. To be considered grounded, the intentional connection must be rated for the circuit fault current and with the use of an approved grounding device or harness.

Ground Fault: an unintentional electrical path between an insulated circuitpart and ground,

High Risk: See *Risk, Arc Flash*.

High Voltage: Electrical circuits operating above 1,000 Volts at Mosaic USA operations.

Incident Energy (E_I): The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. Incident energy is most commonly measured in calories per square centimetre (cal/cm^2).

Practically, this can be considered the determined and documented incident energy exposure (E_I) of the worker in cal/cm^2. The exposure level shall be based on the working distance of the worker's face and chest areas from a prospective arc source for the task to be performed. Worker arc rated clothing and personal protective equipment is selected on the basis of the incident energy exposure associated with the specific task. Because incident energy increases as the distance from the arc flash decreases, additional personal protective equipment is required for any parts of the body that are closer than the distance at which the incident energy was determined.

Incident Energy Analysis: a component of an arc flash hazard analysis used to predict the incident energy of an arc flash event for a specified set of conditions. Included in the analysis is the calculation of the applicable arc flash boundary.

Isolated (as applied to location): Not readily accessible to persons unless special means for access are used.

Isolated (from power sources): Secure physical separation or blocking with non-conductive material sufficient to ensure equipment cannot be energized by identified power sources.

Interlock: a device or system whereby the status of one control or mechanism allows or prevents the operation of another.

Isolation Zone (as referenced in Program section 7 Switching Plan): Work area in which all sources of energy have been intentionally isolated by opening of switches, breakers, or removal of links. Additional working grounds may be required in addition to the temporary protective ground points included in the isolation zone and switching plan.

Look Alike Equipment: Involves equipment that is visually similar in appearance and/or name. Similar or look-alike objects can cause confusion which can lead to mistakes.

Low Risk: See *Risk, Arc Flash*.

Low Voltage: Electrical circuits operating at 1000 Volts and below

Normal Operation: See *Abnormal Operation*. When equipment is**:**

a) Properly Installed,
h) Properly Maintained,
i) All doors are closed and secured,

j) All covers are in place and secured, and
k) There is no evidence of impending failure

Operate: control the functioning of a device; to use or control equipment or a machine or to make something work or change state. (see electrical work).

Qualified Person (Worker): One who has skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to recognize and avoid the hazards involved. See also **Competent Worker**.

Rack-in / Rack-out: See *Racking*.

Racking: The act of engaging or dis-engaging electrical equipment onto or from an electrical bus. Typically this is done energized. Examples would be installing/removing a high or low voltage power circuit breaker from electrical switchgear, or removing a contactor from a miner.

Risk: A combination of the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard.

Risk, Arc Flash: Under normal conditions, equipment that is properly installed, maintained, shows no evidence of impending failure, has up-to-date labels and logs, and with protective doors/covers in place, presents little or no Arc Flash hazard probability. Therefore, the *risk* of an Arc Flash incident is **low** even if there is significant Arc Flash incident energy present.

The Arc Flash *risk* increases significantly under *abnormal conditions*. These conditions may be the result of, but not limited to, equipment being improperly maintained, protective enclosures not properly secured, improper or missing labels, or the impact of downstream electrical equipment. In such circumstances, the Arc Flash hazard rating alone should be followed for PPE consideration. Equipment that is in an abnormal state, and has an incident energy exceeding 40 cal/cm^2 is considered **high** risk.

Risk Assessment: the overall process of hazard identification, risk analysis, and risk evaluation.

Shock: Electric shock is direct contact (or being in close proximity) with exposed energized electrical conductors or circuit parts that causes the flow of electrical current through the body due to a potential difference. A shock hazard must be considered at any voltage equal to or greater than 30 V as defined in CSA Z462

for Canada, or 50 V as defined in NFPA 70E for the United States. Shock hazards exist for both AC and DC voltages/current.

Shock Hazard: A dangerous condition associated with the possible release of energy caused by contact or approach to energized electrical conductors or circuit parts.

Shock Hazard Analysis: Determination of the voltage to which personnel are exposed, boundary requirements, and the personal protective equipment necessary in order to minimize the possibility of electric shock to personnel.

Fault Current Rating (I_{Fault}): The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria.

Single Line Diagram (SLD): Sometimes referred to as an *One Line Diagram*. A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used in the circuit or systems.

Temporary Protective Grounds (TPG): Safety devices installed temporarily on de-energized electric power circuits for the purpose of potential equalization and to conduct a short circuit current for a specified duration (time). TPG's are to be used whenever workers perform tasks on electrical power systems that may become reenergized, possibly by the reclosing of switches or circuit breakers, static voltages, induced voltages in outdoor substations or lines, and capacitive discharges.

Unqualified Person: A person who is not a qualified person to perform a particular task or function.

Voltage, Nominal: A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g. 120/240 V, 480V/277 V or 600 V).

Work: See *Electrical Work*, *Working On*, and ***Error! Reference source not found.***.

Working Distance: The dimension between the possible arc point and the head and body (torso) of the worker positioned in place to perform the assigned task. Default working distances are provided in IEEE 1584 as 18" for low voltage

equipment, 24” for low voltage switchgear and 36” for high voltage switchgear (e.g. 4,160V, 13,800V, 25,000V, etc.).

Working On (energized electrical conductors or circuit parts): Coming in contact with energized electrical conductors or circuit parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment a person is wearing. There are two categories of “Working On”**:**

- **Diagnostic** (testing) – taking readings or measurements of electrical equipment with approved test equipment that does not require making any physical change to the equipment.
- **Repair or Maintenance** – any physical alteration of electrical equipment such as making or tightening connections, removing or replacing components, etc.

Please refer to CSA Z462 Workplace electrical safety Standard, NFPA 70E Standard for Electrical Safety in the Workplace or other applicable Standards or sources for additional definitions.