2012 BOUNDARY APPROACH - SAFETY PROTECTION: WORKING ON OR NEAR ELECTRICAL EQUIPMENT THAT IS ENERGIZED OR COULD BECOME ENERGIZED (AC) (Guidance from NFPA 70E)

	Limited Approach -- Only Qualified Personnel may cross this boundary			Restricted Approach -- Only Qualified Personnel may cross this boundary			Prohibited Approach-- Only Qualified Personnel may cross this boundary		
Reference Standard	NFPA 70E Table 130.2(C)			NFPA 70E Table 130.2(C)			NFPA 70E Table 130.2(C)		
Voltage Range Phase to Phase	Boundary Distance	PPE Required / Hazard Risk Category	Approval	Boundary Distance	PPE Required / Hazard Risk Category	Approval	Boundary Distance	PPE Required / Hazard Risk Category	Approval
Below 50 volts	Note a	Note a	Note a	Note a	Note a	Note a	Note a	Note a	Note a, c
50–240 volts (120/240 V and below)	10 ft	FRC, HHG, SG **Cat 1**	None	Avoid contact	>120V: FRC, HHG, SG, GLV **Cat 1**	None	Avoid contact	> 120V: FRC, HHG, SG, GLV **Cat 1**	> 120V: SUP Energized Work Permit Required
>240–600 volts (277/480 V)	10 ft	FRC, HHG, SG Alternate: C or TC **Cat 2**	None	1 ft	FRC, GLV, HHG, HP, M, SG, SHLD, SLV -- H required at >240V Alternate: C or TC for FRC **Cat 2**	SUP and PS Energized Work Permit Required	1 in	FRC, GLV, HHG, HP, I, M, SG, SHLD, SLV H required at >240V Alternate: C or TC for FRC **Cat 3**	SUP and PS Energized Work Permit Required
>600 V – 12,470 V or 23,000 V	10 ft	FRC, H, HHE, HP, SG **Cat 4**	None	2 ft 7 in	FRC, GLV, H, HHE, HP, I, SG, SLV, M **Cat 4**	SUP and PS Energized Work Permit Required	10 in	FRC, GLV, H, HHE, HP, I. M, SG, SLV **Cat 4**	SUP and HV Eng. Energized Work Permit Required

DEFINITIONS

QUALIFIED: Has had sufficient, documented training and experience and can demonstrate appropriate knowledge and skills to be able to work on electrical equipment, whether energized or de-energized.

LIMITED APPROACH: The distance to any energized electrical equipment that a qualified employee may approach without having supervisory approval.

RESTRICTED APPROACH: The distance to any energized electrical equipment that a qualified employee may approach when using the applicable PPE and with required supervisory approval.

PROHIBITED APPROACH: The distance to any energized electrical equipment that a qualified employee may approach at the voltages listed with supervisory approval and a need to approach such equipment.

C: Coverall, Fire Retardant
FRC: Fire Retardant Clothing
GLV: Electrical Safety Gloves, appropriately rated
H: Double-layer Switching Hood
HHE: Hard Hat rated at 20,000 V
HHG: Hard Hat rated at 2,200 V
HP: Hearing Protection
HV Eng: High Voltage Engineer
I: Insulated Tools
M: Mat, Insulated
PS: Plant Supervisor or Equivalent
SG: Safety Glasses with side shields or Safety Goggles
SHLD: Face Shield – Arc rated
SLV: Sleeve, Insulated
SUP: Supervisor
TC: Trench Coat – Arc rated

NOTE: The class of gloves used on high voltage equipment by personnel in Power Systems is suitable for use on all campus system voltages. The class rating is 3 at 26,500 V AC.

Insulating Glove (Class)	Rated Use Voltage (AC / DC)	Proof-test Voltage (AC / DC)
00	500 / 750	2,500 / 10,000
0	1,000 / 1,500	5,000 / 20,000
1	7,500 / 11,250	10,000 / 40,000
2	17,000 / 25,500	20,000 / 50,000
3	26,500 / 39,750	30,000 / 60,000

Hazard/Risk Category	Arc Rating, Cal/cm²	Personal Protective Clothing
1	4	Flame retardant (FR) shirt and FR pants
2	8	Cotton underwear, FR shirt and FR pants
4	40	Cotton underwear, FR shirt, FR pants, GLV, H, HHE, HP, SG

NOTES:

a. No PPE or approval is required to work on live parts less than 50 volts meeting the exemptions listed in the NCSU Electrical Safety Manual. When the exemptions are not met hazardous arcing can result. If you are unsure of the arc hazard potential, then consult with your Supervisor. If an arcing hazard exists, use appropriate clothing: non-melting / non-flammable or fire resistant clothing, safety glasses with side shields or safety goggles, and electrical safety gloves.

b. Because energy in the arc is limited due to the distribution network impedance in lower voltage circuits, use appropriate clothing: non-melting / non-flammable or fire resistant clothing, safety glasses with side shields or safety goggles, electrical safety gloves, and hard hat are required to cross the Flash Protection Boundary for less than 240 volts, unless work is performed on or near transformers rated greater than or equal to 75 kVA.

c. A face shield is required when inserting or extracting plug-in / rack-in devices on energized equipment.

d. Whenever work on energized equipment is to be carried out, at least two qualified personnel shall be available on the job, with at least one person working as an observer for compliance with safety rules at NCSU.

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