## HALKER

## ELECTRICAL ENGINEERING ARC FLASH ANALYSIS

DESCRIPTION	What causes an Arc Flash event?					
	• An arc flash event is introduced when phase conductors are shorted together or to ground, creating an energy release that can damage equipment and injure personnel.					
	• This is dependent on both the amount of energy in the system, and the amount of time that it takes for the upstream breaker or fuse to open and "clear" the fault.					
	Common Arc Flash Event Scenarios:					
	Dropped tool or loose connection.					
	<ul> <li>A maintenance activity such as racking a unit in or out of a piece of gear.</li> <li>An animal or object touching the bus bars in gear that creates an energy release.</li> </ul>					
COMPLIANCE	Applicable for Commerical, Industrial, PSM & non-PSM facility types.					
	1 OSHA General Duty Clause + 29 CFR 1910	<ul> <li>Each employer shall furnish employees and contractors work environments that are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.</li> <li>To satisfy OSHA, is is necessary to look at NEC and NFPA standands.</li> <li>Electrical equipment, such as switchboards, switchgear, panel boards, industrial control panels, meter socket enclosures, and motor control centers, that are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.</li> <li>A generic label satisfies NEC, but NFPA 70E 130.5 requires a more detailed study per IEEE 1584 in a program like ETAP or SKM.</li> <li>These detailed studies shall be performed and disclose the appropriate PPE levels be given for personnel to work on the equipment under energized conditions.</li> <li>These studies must also be updated periodically (no more than 5 years) or after major system modifications or additions.</li> </ul>				
	2 NEC Section 110.16					
	3 NFPA 70E 130.5					
	4 Hazard Labeling	Generic NFPA 70 Required Label		• Detailed NFPA 70E 130.5 Required Label		
		AWARNING				
		Arc Flash and Shock Hazard Present Appropriate PPE Required		Arc Flash and Shock Hazard Present Appropriate PPE Required		
		Are Flash Boundary Incident Energy Working Distance		0 ft 8 in 0.25 cal/cm <sup>2</sup> 18 in	Arc Flash Boundary Incident Energy Working Distance	9 ft 11 in 26.79 cal/cm <sup>2</sup> 18 in
		Warning: Changes in equi the calculated values.	pment settings or system configu	uration will invalidate	Warning: Changes in equipment settings or syste the calculated values.	m configuration will invalidate
		Equipment PP-1	HALKER	Date: 09-22-2021	Equipment XFMR-1 SEC	Date: 09-27-2021
study components	To satisfy OSHA and N of fit-for-purpose studi	NFPA req es can be	uirement: e conduc	s on new a ted to ens	and existing site. ure safety and c	s, a variety ompliance.
	Existing Facilities  • As-built Sy Schedules • ETAP or SH • Coordinat • Label Proc	(M Modeling M Modeling ion & Arc Flash luction	s & Cable	New Builds	<ul> <li>Facility designed is specified to m</li> <li>Small adder whe other design task</li> </ul>	and equipment inimize hazards en coupled with ks.
	STUDY	DESCRIPTION       What causes an Arc H         • An arc flash event is introd an energy release that can • This is dependent on both for the upstream breaker of Common Arc Flash Event Sec • Dropped tool or loose com • A maintenance activity suc • An animal or object touching         COMPLIANCE       Applicable for Common 4 maintenance activity Clause + 29 CFR 1910         I OSHA General Duty Clause + 29 CFR 1910       2 NEC Section 110.16         STUDY COMPONENTS       To satisfy OSHA and N of fit-for-purpose studie Schedules • ETAP or Site • Label Procession	DESCRIPTION       What causes an Arc Flash event         • An arc flash event is introduced when an energy release that can damage equited the upstream breaker or fuse to op Common Arc Flash Event Scenarios:         • Dropped tool or loose connection.         • A maintenance activity such as racking:         • An animal or object touching the bust         COMPLIANCE         1       OSHA General Duty Clause + 29 CFR 1910         1       OSHA General Duty Clause + 29 CFR 1910         2       NEC Section 110.16         1       OSHA General Duty Clause + 29 CFR 1910         2       NEC Section 110.16         1       OSHA General Duty Clause + 29 CFR 1910         • To satisfy OSHA and NFPA reg         • These sturater major         • Disside to c         • Maintenar         • A generic         • These sturater major         • Thesered to the sturater	DESCRIPTION       What causes an Arc Flash event?         • An arc flash event is introduced when phase condi- an energy release that can damage equipment and • This is dependent on both the amount of energy in for the upstream breaker or fuse to open and 'cleat Common Arc Flash Event Scenarios:         • Dropped tool or loose connection.         • A maintenance activity such as racking a unit in or • An animal or object touching the bus bars in gear         COMPLIANCE       Applicable for Commerical, Industrial, PS • Applicable for Commerical, Industrial, PS • Applicable for Commerical, Industrial, PS • Commerical, Industrial, PS • Applicable for Commerical, Industrial, PS • Applicable for Commerical, Industrial, PS • Beetrical equipment, S • Beetrical equi	DESCRIPTION       What causes an Arc Flash event?         • An arc flash event is introduced when phase conductors are sho an energy release that can damage equipment and injure perso • This is dependent on both the amount of energy in the system, for the upstream breaker or fuse to open and "clear" the fault. Common Arc Flash Event Scenarios:         • Dropped tool or loose connection.         • A maintenance activity such as racking a unit in or out of a piec • An animal or object touching the bus bars in gear that creates a maintenance from recognized hazard death or serious physical harm to his • 20 CRR 1910         • MAC Section 110.16         • NEC Section 110.16         • NEPA 70E 130.5         • A generic label satisfies NEC, but NF study per IEEE 1584 in a program like qualified persons before ex- maintenance of the equipment.         • MIDE Section Secontece Section Section Section Section Section Section	STUDY       What causes an Arc Flash event? <ul> <li>An arc flash event is introduced when phase conductors are shorted together or to gene energy release that can diamage equipment and lique personnel.</li> <li>This is dependent on both the amount of energy in the system, and the amount of the amount of the annum of energy in the system, and the amount of the amount of a piece of gear.</li> <li>This is dependent on both the amount of a nergy in the system, and the amount of the amount of a piece of gear.</li> <li>An animal or object touching the bus bars in gear that creates an energy release.</li> </ul> <li>COMPLIANCE         <ul> <li>Applicable for Commerical, Industrial, PSM &amp; non-PSM facility type</li> <li>I and an object touching the bus bars in gear that creates an energy release.</li> </ul> </li> <li>COMPLIANCE         <ul> <li>Applicable for Commerical, Industrial, PSM &amp; non-PSM facility type</li> <li>I act apployer shall furnish employees and corractors we death or serious physical harm to his employees.</li> <li>I NEC Section 110.16             <ul> <li>I act apployer object and the arc factor may and the act are called at are causing or a death or serious physical harm to his employees.</li> <li>I NERA 70E 1305             <ul> <li>I act apployer object and left apployer shall be facted by a prefer examination, adjustment maintenance of the equipment.</li> <li>I has detailed studies shall be facted by a prefer examination, adjustment maintenance of the equipment.</li> <li>I have the facture are fash apploys and be left of a solutions.</li> <li>I performed to a statistic NEC, but NFA 70E 130.5 requires the statistic may be apply of performed and disclose the the equipme to performed and disclose the equip</li></ul></li></ul></li></ul></li>