Electrical Transient Analyzer Program

Arc Flash Analysis

IEEE 1584-2002
ANSI Short-Circuit

	Swing	V-Control	Load	Total
Number of Buses:	1	1	32	34

	XFMR2	XFMR3	Reactor	Line/Cable	Impedance	Tie PD	Total
Number of Branches:	1	0	0	29	0	3	33

	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machines	Lumped Load	Total
Number of Machines:	0	1	1	0	22	24

System Frequency:	60.00
Unit System:	English
Project Filename:	Power System
Output Filename:	C:\ETAP 1901\Power System\arc_flash.AAFS

Adjustments

Tolerance	Apply Adjustments	Individual /Global	Percent
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable / Busway Length:	No		

Temperature Correction	Apply Adjustments	Individual /Global	Degree C
Transmission Line Resistance:	Yes	Individual	
Cable / Busway Resistance:	Yes	Individual	

Energy Levels

NFPA 70E 2012 to 2018 / User-Defined

Level ID	cal/cm²
Level A	2.00
Level B	4.00
Level C	8.00
Level D	25.00
Level E	40.00
Level F	100.00
Level G	120.00
Level H	0.00
Level I	0.00
Level J	0.00

Bus Input Data

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
Bus M2C	Load	0.208	0.208	1	100.00	0.00
Bus8	Load	0.208	0.208	1	100.00	0.00
Bus 12B	Load	0.208	0.208	1	100.00	0.00
Bus M2E	Load	0.208	0.208	1	100.00	0.00
Bus14	Load	0.208	0.208	1	100.00	0.00
Bus29	Load	0.208	0.208	1	100.00	0.00
Bus51	Gen.	0.208	0.208	1	0.00	0.00
Bus53	Load	0.208	0.208	1	100.00	0.00
Bus54	Load	0.208	0.208	1	100.00	0.00
Bus56	Load	0.208	0.208	1	100.00	0.00
Bus57	Load	0.208	0.208	1	100.00	0.00
Bus58	Load	0.208	0.208	1	100.00	0.00
Bus59	Load	0.208	0.208	1	100.00	0.00
Bus60	Load	0.208	0.208	1	100.00	0.00
Bus61	Load	0.208	0.208	1	100.00	0.00
Bus62	Load	0.208	0.208	1	100.00	0.00
Bus63	Load	0.208	0.208	1	100.00	0.00
Bus64	Load	0.208	0.208	1	100.00	0.00
Bus65	Load	0.208	0.208	1	100.00	0.00
Bus68	Load	0.208	0.208	1	100.00	0.00
Bus69	Load	0.208	0.208	1	100.00	0.00
Bus70	Load	0.208	0.208	1	100.00	0.00
Bus74	Load	0.208	0.208	1	100.00	0.00
Bus75	Load	0.208	0.208	1	100.00	0.00
Bus76	Load	0.208	0.208	1	100.00	0.00
Bus77	Load	0.208	0.208	1	100.00	0.00
Bus78	Load	0.208	0.208	1	100.00	0.00
Bus81	Load	0.208	0.208	1	100.00	0.00
Bus84	Load	0.208	0.208	1	100.00	0.00
Bus88	Load	0.208	0.208	1	100.00	0.00
Bus90	Load	0.208	0.208	1	100.00	0.00
LV Bus	Load	0.208	0.208	1	100.00	0.00
Main Bus	SWNG	25.000	25.000	1	100.00	0.00
UPS Incoming Bus	Load	0.208	0.208	1	100.00	0.00

34 Buses Total

All voltages reported by ETAP are in % of bus Nominal kV.
Base kV values of buses are calculated and used internally by ETAP.

Bus Arc Flash Input Data

Faulted Bus		Arc Flash Ratings			Approach Boundary (ft)			Avail. Protection
ID	Nom. kV	Equip. Type	Gap (mm)	X Factor	Exp. Movable	Fixed Circuit	Restricted	cal/cm²
Bus 12B	0.208	Panelboard	25	1.641	10.000	3.500	1.000	0.00
Bus M2C	0.208	Panelboard	25	1.641	10.000	3.500	1.000	0.00
Bus M2E	0.208	Panelboard	25	1.641	10.000	3.500	1.000	0.00
LV Bus	0.208	Other	13	2.000	10.000	3.500	1.000	0.00
Main Bus	25.000	Other			10.000	6.000	2.750	0.00

The Gap and X-Factors are not utilized if the theoretically derived Lee method was used to determine the incident energy and arc flash boundary .
The Lee method is used if the bus voltage and/or short-circuit parameters are outside the range covered by the IEEE 1584 empirical equations.

Line/Cable/Busway Input Data

ohms or siemens/1000 ft per Conductor (Cable) or per Phase (Line/Busway)

Line/Cable/Busway			Length						
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R	X	Y
Cable7			118.1	0	1	75	0.00100	0.37699	0.0010000
Cable9			65.6	0	1	75	0.00100	0.37699	0.0010000
Cable10			91.9	0	1	75	0.00100	0.37699	0.0010000
Cable72			98.4	0	1	75	0.00100	0.37699	0.0010000
Cable74			91.9	0	1	75	0.00100	0.37699	0.0010000
Cable76			65.6	0	1	75	0.00100	0.37699	0.0010000
Cable77			72.2	0	1	75	0.00100	0.37699	0.0010000
Cable78			72.2	0	1	75	0.00100	0.37699	0.0010000
Cable79			72.2	0	1	75	0.00100	0.37699	0.0010000
Cable80			72.2	0	1	75	0.00100	0.37699	0.0010000
Cable81			118.1	0	1	75	0.00100	0.37699	0.0010000
Cable82			118.1	0	1	75	0.00100	0.37699	0.0010000
Cable83			118.1	0	1	75	0.00100	0.37699	0.0010000
Cable84			95.1	0	1	75	0.00100	0.37699	0.0010000
Cable85			137.8	0	1	75	0.00100	0.37699	0.0010000
Cable86			275.6	0	1	75	0.00100	0.37699	0.0010000
Cable87			150.9	0	1	75	0.00100	0.37699	0.0010000
Cable90			68.9	0	1	75	0.00100	0.37699	0.0010000
Cable91			108.3	0	1	75	0.00100	0.37699	0.0010000
Cable94			137.8	0	1	75	0.00100	0.37699	0.0010000
Cable95			124.7	0	1	75	0.00100	0.37699	0.0010000
Cable96			75.5	0	1	75	0.00100	0.37699	0.0010000
Cable97			108.3	0	1	75	0.00100	0.37699	0.0010000
Cable98			98.4	0	1	75	0.00100	0.37699	0.0010000
Cable101			98.4	0	1	75	0.00100	0.37699	0.0010000
Cable104			20.0	0	1	75	0.00100	0.37699	0.0010000
Cable111			98.4	0	1	75	0.00100	0.37699	0.0010000
Cable113			98.4	0	1	75	0.00100	0.37699	0.0010000
Cable119			98.4	0	1	75	0.00100	0.37699	0.0010000

Line / Cable / Busway resistances are listed at the specified temperatures.

2-Winding Transformer Input Data

Transformer	Rating					Z Variation			% Tap Setting		Adjusted
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z
T14	0.225	25.000	0.208	4.00	3.45	0	0	0	0	0	4.0000

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVAb			
ID	Type	From Bus	To Bus	R	X	Z	Y
T14	2W XFMR	Main Bus	Bus8	494.93	1707.50	1777.78	
Cable7	Cable	LV Bus	UPS Incoming Bus	27.30	10291.78	10291.82	
Cable9	Cable	LV Bus	Bus M2C	15.17	5717.66	5717.68	
Cable10	Cable	LV Bus	Bus29	21.23	8004.72	8004.75	
Cable72	Cable	Bus51	LV Bus	22.75	8576.49	8576.52	
Cable74	Cable	LV Bus	Bus53	21.23	8004.72	8004.75	
Cable76	Cable	LV Bus	Bus54	15.17	5717.66	5717.68	
Cable77	Cable	Bus M2C	Bus68	16.68	6289.42	6289.45	
Cable78	Cable	Bus M2C	Bus56	16.68	6289.42	6289.45	
Cable79	Cable	Bus M2C	Bus57	16.68	6289.42	6289.45	
Cable80	Cable	Bus M2C	Bus58	16.68	6289.42	6289.45	
Cable81	Cable	Bus M2C	Bus59	27.30	10291.78	10291.82	
Cable82	Cable	Bus M2C	Bus60	27.30	10291.78	10291.82	
Cable83	Cable	Bus M2C	Bus61	27.30	10291.78	10291.82	
Cable84	Cable	Bus M2C	Bus62	21.99	8290.60	8290.63	
Cable85	Cable	Bus M2C	Bus63	31.85	12007.08	12007.12	
Cable86	Cable	Bus M2C	Bus64	63.70	24014.16	24014.25	
Cable87	Cable	Bus M2C	Bus65	34.88	13150.61	13150.66	
Cable90	Cable	Bus M2C	Bus69	15.92	6003.54	6003.56	
Cable91	Cable	Bus M2C	Bus70	25.02	9434.14	9434.17	
Cable94	Cable	Bus M2C	Bus74	31.85	12007.08	12007.12	
Cable95	Cable	Bus M2C	Bus75	28.82	10863.55	10863.59	
Cable96	Cable	Bus M2C	Bus76	17.44	6575.31	6575.33	
Cable97	Cable	Bus M2C	Bus77	25.02	9434.14	9434.17	
Cable98	Cable	Bus 12B	Bus78	22.75	8576.49	8576.52	
Cable101	Cable	Bus 12B	Bus81	22.75	8576.49	8576.52	
Cable104	Cable	Bus 12B	Bus84	4.62	1742.74	1742.75	
Cable111	Cable	Bus M2E	Bus88	22.75	8576.49	8576.52	
Cable113	Cable	Bus M2E	Bus90	22.75	8576.49	8576.52	
Cable119	Cable	Bus8	Bus14	22.75	8576.49	8576.52	
CB79	Tie Breaker	Bus53	Bus 12B				
2SW6	Tie Switch	LV Bus	Bus14				
2SW7	Tie Switch	Bus M2E	Bus29				

Power Grid Input Data

Power Grid	Connected Bus	Rating		% Impedance 100 MVA Base		
ID	ID	MVASC	kV	X/R	R	X
U1	Main Bus	250.000	25.000	0.01	39.99800	0.39998

Total Connected Power Grids (= 1): 250.000 MVA

Synchronous Motor Input Data

Synchronous Motor			Connected Bus	Rating			X/R Ratio		% Impedance in Machine Base			
										Xd"		
ID	Type	Qty	ID	kVA	kV	RPM	X"/R	X'/R	R	Adj.	Tol.	Xd'
Syn1	Motor	1	Bus54	28.1	0.200	1800	4.27	4.27	3.907	16.67	0.0	25.00

Total Connected Synchronous Machines (= 1): 28.1 kVA

Lumped Load Input Data

Lumped Load						Motor Loads							Static Loads	
		Rating		% Load		Loading		X/R Ratio		% Impedance (Machine Base)			Loading	
ID	ID	kVA	kV	MTR	STAT	kW	kvar	X"/R	X'/R	R	X"	X'	kW	kvar
Baseboard heater2	Bus69	5.1	0.120	80	20	3.7	1.8	2.38	2.38	8.403	20.00	50.00	0.92	0.45
BaseBoard Heaterr	Bus76	10.0	0.120	80	20	7.2	3.5	2.38	2.38	8.403	20.00	50.00	1.80	0.87
Cu-1	Bus68	4.5	0.208	80	20	3.2	1.6	2.38	2.38	8.403	20.00	50.00	0.81	0.39
Cu-2	Bus56	5.8	0.208	80	20	4.2	2.0	2.38	2.38	8.403	20.00	50.00	1.04	0.51
Cu-3	Bus57	12.6	0.208	80	20	9.1	4.4	2.38	2.38	8.403	20.00	50.00	2.28	1.10
Cu-4	Bus58	12.0	0.208	80	20	8.6	4.2	2.38	2.38	8.403	20.00	50.00	2.16	1.05
DHWT--01	Bus63	0.6	0.120	80	20	0.4	0.2	2.38	2.38	8.403	20.00	50.00	0.11	0.05
EF--01	Bus64	0.3	0.120	80	20	0.2	0.1	2.38	2.38	8.403	20.00	50.00	0.05	0.02
EF--02	Bus65	2.1	0.208	80	20	1.5	0.7	2.38	2.38	8.403	20.00	50.00	0.38	0.18
F-01	Bus59	3.3	0.208	80	20	2.3	1.1	2.38	2.38	8.403	20.00	50.00	0.59	0.28
F-02	Bus60	3.3	0.208	80	20	2.3	1.1	2.38	2.38	8.403	20.00	50.00	0.59	0.28
F-03	Bus61	3.3	0.208	80	20	2.3	1.1	2.38	2.38	8.403	20.00	50.00	0.59	0.28
F-04	Bus62	3.9	0.208	80	20	2.8	1.4	2.38	2.38	8.403	20.00	50.00	0.70	0.34
Force Flow Fan	Bus70	0.6	0.120	80	20	0.5	0.2	2.38	2.38	8.403	20.00	50.00	0.12	0.06
ForceFlow Fan	Bus77	1.5	0.120	80	20	1.1	0.5	2.38	2.38	8.403	20.00	50.00	0.27	0.13
Kitchen Eq1	Bus84	711.6	0.120	80	20	512.4	248.2	2.38	2.38	8.403	20.00	50.00	128.28	62.13
OG Lighting	Bus74	0.4	0.120	80	20	0.3	0.1	2.38	2.38	8.403	20.00	50.00	0.07	0.03
Og Lighting-1-10	Bus78	2.6	0.120	80	20	1.9	0.9	2.38	2.38	8.403	20.00	50.00	0.47	0.23
Og Lighting-1-11	Bus88	0.8	0.120	80	20	0.6	0.3	2.38	2.38	8.403	20.00	50.00	0.14	0.07
OG Power	Bus75	19.2	0.208	80	20	13.8	6.7	2.38	2.38	8.403	20.00	50.00	3.46	1.67
Og Power-1-3	Bus90	50.4	0.120	80	20	36.3	17.6	2.38	2.38	8.403	20.00	50.00	9.09	4.40
Og Power-1-4	Bus81	125.5	0.120	80	20	92.0	40.1	2.38	2.38	8.403	20.00	50.00	23.03	10.04

Total Connected Lumped Loads (= 22): 979.3 kVA

Arc Flash Analysis

1/2 Cycle Calculation Method

Arc Fault at Bus: **Bus 12B**

Solution Method: **1/2 Cycle**

Nominal kV = 0.208 Prefault Voltage = 100% of nominal bus kV System Grounding = Grounded

Base kV = 0.208 = 100% of base kV Working Distance = 18 inches

Bus Arc Flash Results

Total Bolted (kA)	Total Arcing (kA)	Fault Clearing Time (cycles)	(Seconds)	(cal/cm²)
Ibf" = 13.351	Ia" = 5.329	FCT = 120.0	2.000	Incident Energy = 33.629
	‡ **Fault Clearing Time =**	120.0	2.000	**Total Incident Energy =** 33.629

For Protective Device: CB78@ Ia" =0.836 kA

Energy Level* **Level E**

Arc Flash Boundary = 11.43 ft

Arc Fault at Device			Individual Contribution to Bus Arc Fault			Incident Energy					
ID	Phase Type	Type	Bolted (kA)	Arcing (kA)	FCT (cycles)	Arcing (kA)	FCT (cycles)	Protective Device ID for FCT	Incident E (cal/cm²)	AFB (ft)	Energy Level*
‡ CB103	3Ph	LV CB	0.078	0.031		5.329	120.0	CB78	33.629		
						FCT =	120.0	**Total =**	33.629	11.43	**Level E**
‡ CB106	3Ph	LV CB	1.795	0.716		5.329	120.0	CB78	33.629		
						FCT =	120.0	**Total =**	33.629	11.43	**Level E**
‡ CB109	3Ph	LV CB	9.397	3.750		5.329	120.0	CB78	33.629		
						FCT =	120.0	**Total =**	33.629	11.43	**Level E**
‡ CB79	3Ph	LV CB	2.095	0.836		5.329	120.0	CB78	33.629		
						FCT =	120.0	**Total =**	33.629	11.43	**Level E**

‡This Fault Clearing Time (FCT) has been limited to the maximum value allowed in the study case. The incident energy will be calculated using this value.

* User-Defined energy levels are used.

♦ Arcing current variation was applied at this location.

Arc Flash Analysis

1/2 Cycle Calculation Method

Arc Fault at Bus: **Bus M2C**

Solution Method: **1/2 Cycle**

Nominal kV = 0.208 | Prefault Voltage = 100% of nominal bus kV | System Grounding = Grounded

Base kV = 0.208 | = 100% of base kV | Working Distance = 18 inches

Bus Arc Flash Results

Total Bolted (kA)	Total Arcing (kA)	Fault Clearing Time (cycles)	(Seconds)	(cal/cm²)	
Ibf" = 4.043	♦Ia" = 1.957	FCT = 120.0	2.000	Incident Energy =	11.391
	♯ **Fault Clearing Time =**	120.0	2.000	**Total Incident Energy =**	11.391

For Protective Device: CB81@ 85% Ia" =1.384 kA

Energy Level* **Level D**

Arc Flash Boundary = 5.91 ft

Arc Fault at Device			Individual Contribution to Bus Arc Fault			Incident Energy					
ID	Phase Type	Type	Bolted (kA)	Arcing (kA)	FCT (cycles)	Arcing (kA)	FCT (cycles)	Protective Device ID for FCT	Incident E (cal/cm²)	AFB (ft)	Energy Level*
♦ ♯ CB100	3Ph	LV CB	0.020	0.010		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ♯ CB113	3Ph	LV CB	0.012	0.006		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ♯ CB114	3Ph	LV CB	0.183	0.089		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ♯ CB115	3Ph	LV CB	0.288	0.139		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ♯ CB116	3Ph	LV CB	0.045	0.022		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ♯ CB82	3Ph	LV CB	2.858	1.384		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ♯ CB86	3Ph	LV CB	0.046	0.022		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**

Arc Flash Analysis

1/2 Cycle Calculation Method

Arc Fault at Bus: **Bus M2C**

Solution Method: **1/2 Cycle**

Nominal kV = 0.208 | Prefault Voltage = 100% of nominal bus kV | System Grounding = Grounded

Base kV = 0.208 | = 100% of base kV | Working Distance = 18 inches

Bus Arc Flash Results

Total Bolted (kA)	Total Arcing (kA)	Fault Clearing Time (cycles)	Fault Clearing Time (Seconds)	(cal/cm²)	
Ibf" = 4.043	♦Ia" = 1.957	FCT =	120.0	2.000	Incident Energy = 11.391
	♦	**Fault Clearing Time =**	120.0	2.000	**Total Incident Energy =** 11.391

For Protective Device: CB81@ 85% Ia" =1.384 kA

Energy Level* **Level D**

Arc Flash Boundary = 5.91 ft

Arc Fault at Device			Individual Contribution to Bus Arc Fault			Incident Energy					
ID	Phase Type	Type	Bolted (kA)	Arcing (kA)	FCT (cycles)	Arcing (kA)	FCT (cycles)	Protective Device ID for FCT	Incident E (cal/cm²)	AFB (ft)	Energy Level*
♦ ≠ CB87	3Ph	LV CB	0.059	0.028		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB88	3Ph	LV CB	0.126	0.061		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB89	3Ph	LV CB	0.120	0.058		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB90	3Ph	LV CB	0.033	0.016		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB91	3Ph	LV CB	0.033	0.016		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB92	3Ph	LV CB	0.033	0.016		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB93	3Ph	LV CB	0.039	0.019		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**

Arc Flash Analysis

1/2 Cycle Calculation Method

Arc Fault at Bus: **Bus M2C**

Solution Method: **1/2 Cycle**

Nominal kV = 0.208 Prefault Voltage = 100% of nominal bus kV System Grounding = Grounded

Base kV = 0.208 = 100% of base kV Working Distance = 18 inches

Bus Arc Flash Results

Total Bolted (kA)	Total Arcing (kA)	Fault Clearing Time (cycles)	(Seconds)	(cal/cm²)	
Ibf" = 4.043	♦Ia" = 1.957	FCT = 120.0	2.000	Incident Energy =	11.391
	≠ **Fault Clearing Time =**	120.0	2.000	**Total Incident Energy =**	11.391

For Protective Device: CB81@ 85% Ia" =1.384 kA

Energy Level* **Level D**

Arc Flash Boundary = 5.91 ft

Arc Fault at Device			Individual Contribution to Bus Arc Fault			Incident Energy					
ID	Phase Type	Type	Bolted (kA)	Arcing (kA)	FCT (cycles)	Arcing (kA)	FCT (cycles)	Protective Device ID for FCT	Incident E (cal/cm²)	AFB (ft)	Energy Level*
♦ ≠ CB94	3Ph	LV CB	0.018	0.009		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB95	3Ph	LV CB	0.008	0.004		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB96	3Ph	LV CB	0.021	0.010		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**
♦ ≠ CB99	3Ph	LV CB	0.152	0.074		1.957	120.0	CB81	11.391		
						FCT =	120.0	**Total =**	11.391	5.91	**Level D**

≠This Fault Clearing Time (FCT) has been limited to the maximum value allowed in the study case. The incident energy will be calculated using this value.

* User-Defined energy levels are used.

♦ Arcing current variation was applied at this location.

Arc Flash Analysis

1/2 Cycle Calculation Method

Arc Fault at Bus: **Bus M2E**

Solution Method: **1/2 Cycle**

Nominal kV = 0.208 | Prefault Voltage = 100% of nominal bus kV | System Grounding = Grounded

Base kV = 0.208 | = 100% of base kV | Working Distance = 18 inches

Bus Arc Flash Results

Total Bolted (kA)	Total Arcing (kA)	Fault Clearing Time (cycles)	(Seconds)	(cal/cm²)	
Ibf" = 3.399	Ia" = 2.039	FCT = 120.0	2.000	Incident Energy =	11.904
	‡ **Fault Clearing Time =**	120.0	2.000	**Total Incident Energy =**	11.904

For Protective Device: CB126@ Ia" =1.398 kA

Energy Level* **Level D**

Arc Flash Boundary = 6.07 ft

Arc Fault at Device			Individual Contribution to Bus Arc Fault			Incident Energy					
ID	Phase Type	Type	Bolted (kA)	Arcing (kA)	FCT (cycles)	Arcing (kA)	FCT (cycles)	Protective Device ID for FCT	Incident E (cal/cm²)	AFB (ft)	Energy Level*
‡ CB117	3Ph	LV CB	0.024	0.015		2.039	120.0	CB126	11.904		
						FCT =	120.0	**Total =**	11.904	6.07	**Level D**
‡ CB119	3Ph	LV CB	1.066	0.640		2.039	120.0	CB126	11.904		
						FCT =	120.0	**Total =**	11.904	6.07	**Level D**

‡This Fault Clearing Time (FCT) has been limited to the maximum value allowed in the study case. The incident energy will be calculated using this value.

* User-Defined energy levels are used.

♦ Arcing current variation was applied at this location.

Arc Flash Analysis

1/2 Cycle Calculation Method

Arc Fault at Bus: **LV Bus**

Solution Method: **1/2 Cycle**

Nominal kV = 0.208 | Prefault Voltage = 100% of nominal bus kV | System Grounding = Grounded

Base kV = 0.208 | = 100% of base kV | Working Distance = 18 inches

Bus Arc Flash Results

Total Bolted (kA)	Total Arcing (kA)	Fault Clearing Time (cycles) (Seconds)	Incident Energy (cal/cm²)
Ibf" = 7.773	Ia" = 3.871	FCT Cannot be Determined!	Incident Energy Cannot be Determined!

Arc Fault at Device			Individual Contribution to Bus Arc Fault			Incident Energy					
ID	Phase Type	Type	Bolted (kA)	Arcing (kA)	FCT (cycles)	Arcing (kA)	FCT (cycles)	Protective Device ID for FCT	Incident E (cal/cm²)	AFB (ft)	Energy Level*
CB56	3Ph	LV CB	0.175	0.087				Cannot be Determined			
CB77	3Ph	LV CB	0.449	0.223				Cannot be Determined			
CB78	3Ph	LV CB	2.658	1.324				Cannot be Determined			
CB80	3Ph	LV CB	0.835	0.416				Cannot be Determined			
CB81	3Ph	LV CB	0.997	0.497				Cannot be Determined			
CB83	3Ph	LV CB	0.000	0.000				Cannot be Determined			

♦ Arcing current variation was applied at this location.

Arc Flash Analysis

1/2 Cycle Calculation Method

Arc Fault at Bus: **Main Bus**

Solution Method: **1/2 Cycle**

Nominal kV	= 25.000	Prefault Voltage	= 100% of nominal bus kV	System Grounding	= Grounded
Base kV	= 25.000		= 100% of base kV	Working Distance	= 18 inches

Bus Arc Flash Results

Total Bolted (kA)	Total Arcing (kA)	Fault Clearing Time (cycles) (Seconds)	Incident Energy (cal/cm²)
Ibf" = 5.775	Ia" = 5.775	FCT Cannot be Determined!	Incident Energy Cannot be Determined!

Arc Fault at Device			Individual Contribution to Bus Arc Fault			Incident Energy					
ID	Phase Type	Type	Bolted (kA)	Arcing (kA)	FCT (cycles)	Arcing (kA)	FCT (cycles)	Protective Device ID for FCT	Incident E (cal/cm²)	AFB (ft)	Energy Level*

♦ Arcing current variation was applied at this location.

Bus Incident Energy Summary

Bus			Total Fault Current (kA)		Arc-Flash Analysis Results			
ID	Nom. kV	Type	Bolted	Arcing	FCT (cycles)	Incident E (cal/cm²)	AFB (ft)	Energy Level
Bus 12B	0.208	Panelboard	13.351	5.329	120.000	33.629	11.43	Level E
Bus M2C	0.208	Panelboard	4.043	1.957	120.000	11.391	5.91	Level D
Bus M2E	0.208	Panelboard	3.399	2.039	120.000	11.904	6.07	Level D
LV Bus	0.208	Other	7.773	3.871				
# Main Bus	25.000	Other	5.775	5.775				

The theoretically-derived Lee method was used to determine the incident energy and arc -flash boundary for this location since some of the input parameters may be outside the range of the IEEE 1584 methods.

Bus Arc Flash Hazard Analysis Summary

Faulted Bus				Fault Current			Trip Device							
ID	Nom. kV	Equipment Type	Gap (mm)	Bolted Fault (kA) Bus	Bolted Fault (kA) PD	PD Arc Fault (kA)	Source Trip Device ID	Trip (cycle)	Open (cycle)	FCT (cycle)	Arc Flash Boundary (ft)	Incident Energy (cal/cm²)	Working Distance (inches	Energy Level
Bus 12B	0.208	Panelboard	25	13.351	2.095	0.836	CB78	120.00	0.00	120.00	11.4	33.6	18	Level E
Bus M2C	0.208	Panelboard	25	4.043	2.858	1.384	CB81	120.00	0.00	120.00	5.9	11.4	18	Level D
Bus M2E	0.208	Panelboard	25	3.399	2.330	1.398	CB126	120.00	0.00	120.00	6.1	11.9	18	Level D
LV Bus	0.208	Other	13	7.773							0.0	0.0	18	
# Main Bus	25.000	Other		5.775							0.0	0.0	18	

The theoretically-derived Lee method was used to determine the incident energy and arc-flash boundary for this location since some of the input parameters may be outside the range of the IEEE 1584 methods.