

Project:	ETAP	Page:	1
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

Electrical Transient Analyzer Program

Short-Circuit Analysis

ANSI Standard

3-Phase, LG, LL, & LLG Fault Currents

1/2 Cycle Network

	Swing	V-Control	Load	Total			
Number of Buses:	1	2	6	9			
	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	5	0	0	3	0	0	8
	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machines	Lumped Load	Total	
Number of Machines:	3	0	0	2	6	11	

System Frequency:	60.00
Unit System:	English
Project Filename:	grid5
Output Filename:	C:\Users\owner's\Desktop\PSA PBL\grid5\grid5\Untitled.SQ1S

Project:	ETAP	Page:	2
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

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	

Project:	ETAP	Page:	3
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

Bus Input Data

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
Bus1	SWNG	11.000	11.000	1	100.00	0.00
Bus2	Load	129.400	132.000	1	100.00	30.00
Bus3	Load	129.500	132.000	1	100.00	30.00
Bus4	Load	129.400	132.000	1	100.00	30.00
Bus5	Load	10.760	11.000	1	100.00	0.00
Bus6	Gen.	10.760	11.000	1	102.23	0.00
Bus7	Load	129.400	132.000	1	100.00	30.00
Bus8	Gen.	10.800	11.000	1	101.85	0.00
Bus9	Load	0.414	0.415	1	100.00	-30.00
9 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.

Project:	ETAP	Page:	4
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

Line/Cable/Busway Input Data

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

Line/Cable/Busway												
ID	Library	Size	Length		#/Phase	T (°C)	R1	X1	Y1	R0	X0	Y0
			Adj. (ft)	% Tol.								
Line1		477	5280.0	0.0	1	75	0.0446045	0.1577493	0.000001	0.0956523	0.4853866	0.0000005
Line3		477	5280.0	0.0	1	75	0.0446045	0.1577493	0.000001	0.0956523	0.4853866	0.0000005
Line7		477	5280.0	0.0	1	75	0.0446045	0.1577493	0.000001	0.0956523	0.4853866	0.0000005

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

2-Winding Transformer Input Data

Transformer		Rating				Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T1	10.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.00	YNd	30.00
T3	100.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.00	YNd	30.00
T7	15.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.00	YNd	30.00
T10	0.500	11.000	0.415	5.20	5.10	0	0	0	0	0	5.20	Dyn	30.00
T12	0.400	11.000	132.000	9.00	2.47	0	0	0	0	0	9.00	YNd	30.00

2-Winding Transformer Grounding Input Data

				Grounding								
Transformer		Rating		Conn.	Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	ohm	Type	kV	Amp	ohm
T1	10.000	11.000	132.000	D/Y					Solid			
T3	100.000	11.000	132.000	D/Y					Solid			
T7	15.000	11.000	132.000	D/Y					Solid			
T10	0.500	11.000	0.415	D/Y					Solid			
T12	0.400	11.000	132.000	D/Y					Solid			

Project: ETAP
Location: 19.0.1C
Contract:
Engineer:
Filename: grid5
Study Case: SM

Page: 6
Date: 07-11-2025
SN:
Revision: Base
Config.: Normal

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVAb			
ID	Type	From Bus	To Bus	R	X	Z	Y
T1	2W XFMR	Bus1	Bus2	33.77	83.42	90.00	
T3	2W XFMR	Bus5	Bus4	3.38	8.34	9.00	
T7	2W XFMR	Bus8	Bus3	22.52	55.61	60.00	
T10	2W XFMR	Bus8	Bus9	200.11	1020.57	1040.00	
T12	2W XFMR	Bus6	Bus7	844.36	2085.56	2250.00	
Line1	Line	Bus3	Bus2	0.14	0.48	0.50	0.0895860
Line3	Line	Bus3	Bus4	0.14	0.48	0.50	0.0895860
Line7	Line	Bus5	Bus6	19.46	68.84	71.53	0.0006221

Synchronous Generator Input Data

Synchronous Generator					Positive Seq. Impedance					Grounding			Zero Seq. Impedance		
					Rating										
ID	Type	MVA	kV	RPM	X''/R	% R	Adj.	Tol.	% Xd'	Conn.	Type	Amp	X/R	% R0	% X0
Gen1	Steam Turbo	70.588	11.000	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00
Gen2	Steam Turbo	35.294	11.000	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00
Gen3	Steam Turbo	70.588	11.000	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00

Total Connected Synchronous Generators (= 3): 176.471 MVA

Project:ETAP

Location:19.0.1C

Contract:

Engineer:

Filename:grid5

Page:8

Date:07-11-2025

SN:

Revision:Base

Config.:Normal

Study Case: SM

Induction Machine Input Data

Induction Machine			Rating (Base)			Positive Seq. Imp.				Grounding			Zero Seq. Imp.		
ID	Type	Qty	kVA	kV	RPM	X"/R	% R	% X"	% X'	Conn.	Type	Amp	X/R	% R0	% X0
Mtr1	Motor	1	119.89	11.000	1800	8.56	2.158	18.46	46.15	Wye	Open		8.56	2.16	18.46
Mtr2	Motor	1	7.91	0.415	1800	2.02	13.802	27.83	9999.00	Wye	Open		2.02	13.80	27.83

Total Connected Induction Machines (= 2): 127.8 kVA

Filename: grid5

Study Case: SM

Config.: Normal

Total Connected Lumped Loads (= 6): 3260.0 kVA

Project:	ETAP	Page:	10
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

SHORT- CIRCUIT REPORT

Fault at bus: **Bus3**

Prefault voltage = 129.500 kV
= 100.00 % of nominal bus kV (129.500 kV)
= 98.11 % of base kV (132.000 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	3I0	R1	X1	R0	X0
Bus3	Total	0.00	1.228	0.00	86.48	88.72	1.658	1.658	9.09E+000	3.38E+001	2.89E+000	7.60E+000
Bus2	Bus3	0.43	0.369	0.56	86.54	88.80	0.381	0.147	3.53E+001	1.11E+002	3.41E+001	8.49E+001
Bus4	Bus3	0.42	0.359	1.87	86.17	88.71	0.752	1.287	2.23E+001	1.18E+002	3.67E+000	9.81E+000
Bus8	Bus3	70.01	0.501	83.58	77.89	99.44	0.526	0.225 *	2.39E+001	8.22E+001	2.25E+001	5.56E+001
Bus1	Bus2	76.42	0.369	86.18	81.91	97.75	0.381	0.147 *	3.52E+001	1.10E+002	3.38E+001	8.34E+001
Bus5	Bus4	7.96	0.359	53.76	50.58	99.80	0.752	1.287 *	2.21E+001	1.17E+002	3.38E+000	8.34E+000
Bus9	Bus8	69.47	0.003	94.54	72.86	89.92	0.003	0.000	5.66E+004	7.40E+004		
Gen3	Bus8	98.11	5.943	98.11	98.11	98.11	4.634	0.000	1.42E+000	2.69E+001	1.42E+000	9.92E+000
Mtr1	Bus8	98.11	0.010	98.11	98.11	98.11	0.008	0.000	1.80E+003	1.54E+004		
Lump4	Bus8	98.11	0.058	98.11	98.11	98.11	0.045	0.000	4.12E+002	2.75E+003		
Gen1	Bus1	98.11	4.408	98.11	98.11	98.11	3.437	0.000	1.42E+000	2.69E+001	1.42E+000	9.92E+000
Lump5	Bus1	98.11	0.024	98.11	98.11	98.11	0.019	0.000	7.21E+002	4.81E+003		
Bus6	Bus5	61.05	3.814	77.92	73.18	99.66	2.978	0.000	4.74E+001	1.18E+002		
Lump1	Bus5	98.11	0.491	98.11	98.11	98.11	0.383	0.000	9.62E+001	9.62E+002		
Mtr2	Bus9	98.11	0.011	98.11	98.11	98.11	0.005	0.000	1.75E+005	3.52E+005		
Lump6	Bus9	98.11	0.077	98.11	98.11	98.11	0.035	0.000	2.10E+004	5.00E+004		

Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta- Y transformer

Short-Circuit Summary Report

1/2 Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of the Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			*Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
Bus3	129.500	0.319	-1.185	1.228	0.462	-1.593	1.658	1.030	0.288	1.069	-1.389	0.923	1.668

All fault currents are symmetrical (1/2 Cycle network) values in rms kA.

* LLG fault current is the larger of the two faulted line currents.

Project:

Location:

Contract:

Engineer:

Filename: grid5

ETAP

19.0.1C

Study Case: SM

Page: 12

Date: 07-11-2025

SN:

Revision: Base

Config.: Normal

Sequence Impedance Summary Report

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault Zf (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
Bus3	129.500	15.84017	58.80910	60.90502	16.78235	57.85316	60.23815	5.03376	13.23538	14.16030	0.00000	0.00000	0.00000

Sequence-of-Operation Event Summary Report

Symmetrical 3-Phase Fault at Bus3.

Time (ms)	ID	If (kA)	T1 (ms)	T2 (ms)	Condition
2.1	Relay1	4.432	2.1		Phase - OC1 - 50
20.0	Relay1		20.0		Phase - 87
85.4	CB4		83.3		Tripped by Relay1 Phase - OC1 - 50
85.4	CB5		83.3		Tripped by Relay1 Phase - OC1 - 50
99.4	Relay1	4.432	99.4		Phase - OC1 - 51
103	CB4		83.3		Tripped by Relay1 Phase - 87
103	CB5		83.3		Tripped by Relay1 Phase - 87
183	CB4		83.3		Tripped by Relay1 Phase - OC1 - 51
183	CB5		83.3		Tripped by Relay1 Phase - OC1 - 51