

Project:	ETAP	Page:	1
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid4	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	1	7	9			
	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	3	0	0	6	0	0	9
	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machines	Lumped Load	Total	
Number of Machines:	2	0	0	0	5	7	

System Frequency:	60.00
Unit System:	English
Project Filename:	grid4
Output Filename:	C:\Users\owner's\Desktop\PSA PBL\grid4\grid4\Untitled.SQ1S

Project:	ETAP	Page:	2
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid4	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:	grid4	Config.:	Normal

Bus Input Data

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
Bus_1	SWNG	11.000	11.000	1	100.00	0.00
Bus_2	Gen.	11.000	11.000	1	100.00	0.00
Bus_3	Load	211.000	230.000	1	100.00	30.00
Bus_4	Load	211.000	230.000	1	100.00	30.00
Bus_5	Load	211.000	230.000	1	100.00	30.00
Bus_6	Load	211.000	230.000	1	100.00	30.00
Bus_7	Load	211.000	230.000	1	100.00	30.00
Bus_8	Load	211.000	230.000	1	100.00	30.00
Bus_9	Load	9.500	11.000	1	100.00	0.00
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:	grid4	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	-30	0.029292	0.1577493	0.000001	0.0803398	0.4853866	0.0000005
Line3		477	5280.0	0.0	1	-30	0.029292	0.1577493	0.000001	0.0803398	0.4853866	0.0000005
Line5		477	5280.0	0.0	1	-30	0.029292	0.1577493	0.000001	0.0803398	0.4853866	0.0000005
Line7		477	5280.0	0.0	1	-30	0.029292	0.1577493	0.000001	0.0803398	0.4853866	0.0000005
Line9		477	5280.0	0.0	1	-30	0.029292	0.1577493	0.000001	0.0803398	0.4853866	0.0000005
Line10		477	5280.0	0.0	1	-30	0.029292	0.1577493	0.000001	0.0803398	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	157.000	11.000	230.000	10.00	34.10	0	0	0	0	0	10.00	YNd	30.00
T3	100.000	11.000	230.000	10.00	34.10	0	0	0	0	0	10.00	YNd	30.00
T4	100.300	230.000	11.000	10.00	34.10	0	0	0	0	0	10.00	Dyn	30.00

2-Winding Transformer Grounding Input Data

Transformer	Rating			Grounding									
	ID	MVA	Prim. kV	Sec. kV	Conn.	Primary				Secondary			
					Type	Type	kV	Amp	ohm	Type	kV	Amp	ohm
T1		157.000	11.000	230.000	D/Y					Solid			
T3		100.000	11.000	230.000	D/Y					Solid			
T4		100.300	230.000	11.000	D/Y					Solid			

Project: ETAP
Location: 19.0.1C
Contract:
Engineer:
Filename: grid4
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	Bus_1	Bus_3	0.19	6.37	6.37	
T3	2W XFMR	Bus_2	Bus_3	0.29	10.00	10.00	
T4	2W XFMR	Bus_8	Bus_9	0.29	9.97	9.97	
Line1	Line	Bus_3	Bus_4	0.03	0.16	0.16	0.2719868
Line3	Line	Bus_4	Bus_5	0.03	0.16	0.16	0.2719868
Line5	Line	Bus_6	Bus_3	0.03	0.16	0.16	0.2719868
Line7	Line	Bus_7	Bus_5	0.03	0.16	0.16	0.2719868
Line9	Line	Bus_8	Bus_6	0.03	0.16	0.16	0.2719868
Line10	Line	Bus_8	Bus_7	0.03	0.16	0.16	0.2719868

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	100.000	11.000	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00
Gen3	Steam Turbo	111.765	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 (= 2): 211.765 MVA

Page: 8

Date: 07-11-2025

SN:

Revision: Base

Config.: Normal

Total Connected Lumped Loads (= 5): 155000.0 kVA

Project:	ETAP	Page:	9
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid4	Config.:	Normal

SHORT- CIRCUIT REPORT

Fault at bus: **Bus_4**

Prefault voltage = 211.000 kV
= 100.00 % of nominal bus kV (211.000 kV)
= 91.74 % of base kV (230.000 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
Bus_4	Total	0.00	4.315	0.00	97.49	95.36	4.638	4.638	3.48E-001	5.33E+000	1.81E-001	4.29E+000
Bus_3	Bus_4	1.63	2.338	3.92	96.72	94.23	2.970	3.865	5.41E-001	9.83E+000	2.17E-001	5.15E+000
Bus_5	Bus_4	0.96	1.382	1.24	97.41	95.26	1.244	0.773	1.13E+000	1.66E+001	1.09E+000	2.58E+001
Manufacturing Plant	Bus_4	91.74	0.596	91.74	91.74	91.74	0.424	0.000	3.85E+000	3.85E+001		
Bus_6	Bus_3	2.05	0.608	3.67	96.95	94.60	0.171	0.773	2.76E+000	3.72E+001	6.84E-001	2.33E+001
Bus_1	Bus_3	24.12	0.892	58.46	60.23	91.10	1.591	2.833 *	1.19E+000	2.54E+001	1.87E-001	6.37E+000
Bus_2	Bus_3	34.88	0.838	62.92	64.76	91.08	1.208	1.805 *	1.19E+000	2.70E+001	2.93E-001	1.00E+001
Bus_7	Bus_5	1.72	1.087	2.33	97.30	95.12	1.035	0.773	1.21E+000	2.10E+001	1.01E+000	2.53E+001
Data Center	Bus_5	91.74	0.295	91.74	91.74	91.74	0.210	0.000	7.69E+000	7.69E+001		
Bus_8	Bus_6	2.23	0.258	3.24	97.16	94.93	0.078	0.773	3.33E+000	8.74E+001	7.65E-001	2.38E+001
University	Bus_6	91.74	0.350	91.74	91.74	91.74	0.249	0.000	6.41E+000	6.41E+001		
Gen1	Bus_1	91.74	18.655	91.74	91.74	91.74	11.620	0.000	1.00E+000	1.90E+001	1.00E+000	7.00E+000
Gen3	Bus_2	91.74	17.532	91.74	91.74	91.74	10.912	0.000	8.95E-001	1.70E+001	8.95E-001	6.26E+000
Bus_8	Bus_7	2.23	0.736	3.24	97.16	94.93	0.785	0.773	1.11E+000	3.07E+001	9.25E-001	2.48E+001
Shopping Mall	Bus_7	91.74	0.351	91.74	91.74	91.74	0.250	0.000	6.41E+000	6.41E+001		

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

Project:	ETAP	Page:	10
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid4	Config.:	Normal

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.
Bus_4	211.000	0.281	-4.306	4.315	0.297	-4.629	4.638	3.753	0.274	3.763	3.630	2.730	4.542

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: grid4

ETAP
19.0.1C

Study Case: SM

Page: 11
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
Bus_4	211.000	1.83912	28.16960	28.22957	2.24758	27.75169	27.84255	0.95686	22.71052	22.73066	0.00000	0.00000	0.00000

Sequence-of-Operation Event Summary Report

Symmetrical 3-Phase Fault at Bus_4.

Time (ms)	ID	If (kA)	T1 (ms)	T2 (ms)	Condition
99.4	Relay1	1.382	99.4		Phase - OC1 - 51
105	Relay2	0.994	105		Phase - OC1 - 51
133	CB_7		33.3		Tripped by Relay1 Phase - OC1 - 51
133	CB_8		33.3		Tripped by Relay1 Phase - OC1 - 51
139	CB_17		33.3		Tripped by Relay2 Phase - OC1 - 51
139	CB_18		33.3		Tripped by Relay2 Phase - OC1 - 51