Quantification of Energy Efficiency in the Utilities of the U.S. Affiliate States (Excluding US Virgin Islands)

Data Handbook

Pacific Power Association.

Prepared for Guam Power Authority

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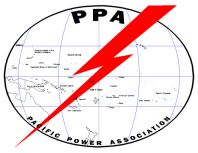

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1. Introduction

KEMA Inc has been awarded by the Pacific Power Association (PPA) in Fiji to carry out a project called “Quantification of Energy Efficiency in the Utilities of the U.S. Affiliate States (Excluding US Virgin Islands)”.

As part of the deliverables of this project, an Electrical Data Handbook has been prepared containing all the electrical characteristics of the power system high voltage equipment for each of the utilities. This document represents the Electrical Data Handbook for Guam Power Authority (GPA). All relevant data of the high and medium voltage assets, such as generation data, impedances of lines, cables, transformers, and other equipments are included as far as the relevant data could be gathered. KEMA has incorporated major data of components and equipment in power generation, transmission, distribution and metering. A data template is established to hold comprehensive equipment data, for example for transformer power ratings, primary and secondary voltages, load and no load losses, tap changer data, BIL ratings, cooling class, applicable standards, weight, etc.

2. Power Plant Data

2.1 Generators

Generator data are identified from the GPA power system model. Generator data are listed in the Table 1.

Table 1 – Generators

BUS-NO	GENERATOR NAME	BASE VOLTAGE (kV)	BASE MVA	PMAX (MW)	PMIN (MW)	QMAX (MVAR)	QMIN (MVAR)	Date in Service			Status*
								Year	Month	Day	
1	Cabras_1	13.8	78	66	25	41	-28	90	1	1	1
2	Cabras_2	13.8	78	66	25	41	-28	90	1	1	1
9	ManenDsl	13.8	7.3	5	0	3	-4.7	90	1	1	0
9	ManenDsl	13.8	7.3	5	0	3	-4.7	90	1	1	0
10	TalofDsl	13.8	5	4.4	0	2	-4.7	90	1	1	0
10	TalofDsl	13.8	5	4.4	0	2	-4.7	90	1	1	0
11	TenjoDsl	13.8	5	4.4	0	2	0	40	1	1	0
11	TenjoDsl	13.8	5	4.4	0	2	0	40	1	1	0
11	TenjoDsl	13.8	5	4.4	0	2	0	40	1	1	0
11	TenjoDsl	13.8	5	4.4	0	2	0	40	1	1	0
11	TenjoDsl	13.8	5	4.4	0	1.5	-1.5	40	1	1	0
11	TenjoDsl	13.8	5	4.4	0	1.5	-1.5	40	1	1	0
11	TenjoDsl	13.8	5	4.4	0	1.5	-1.5	40	1	1	0
11	TenjoDsl	13.8	5	4.4	0	1.5	-1.5	40	1	1	0
12	Cabras_3	13.8	49	38.4	22	22	-15	90	1	1	1
13	Cabras_4	13.8	49	38.4	22	20	-15	90	1	1	1

14	OrteUnts	13.8	12	6.6	0	5	0	95	11	1	0
14	OrteUnts	13.8	12	6.6	0	5	0	95	11	1	0
14	OrteUnts	13.8	12	6.6	0	5	0	95	11	1	0
15	TEMES	13.8	50.3	40	0	27	-10	95	11	1	0
16	MEC 8	13.8	51.9	44.2	22	35	-10	99	1	1	1
17	MEC 9	13.8	51.9	44.2	22	35	-10	95	11	1	1
201	Tangui_1	14.4	29	25	0	15	-12	90	1	1	1
202	Tangui_2	14.4	29	25	0	16	-12.6	90	1	1	0
203	DededDsl	4.16	6	4	0	3	-3	90	1	1	0
204	DededDsl	4.16	6	4	0	3	-3	90	1	1	0
205	Marbo CT	13.8	20	15	0	10	-7.8	90	1	1	0
208	Ded CT#1	13.8	26	20	19	12.5	-10	90	1	1	0
209	Ded CT#2	13.8	26	20	0	12.5	-10	90	1	1	0
210	Mache_CT	13.8	26	20	0	13.4	-10.5	90	1	1	0
211	Yigo__CT	13.8	26	21	0	13.6	-9.7	90	1	1	0

* Status of Generator: 1= On-line, 2=Off-line, as indicated in 101309 7pm.sav representing peak load condition.

3. Transmission System Data

Transmission system equipments data listed in this section, including data for power transformers, transmission lines and shunt capacitors.

3.1 Power Transformers

Power transformer data are listed in the Table 2.

Table 2 – Power Transformers

No.	From Bus	Bus No.	To Bus	Bus No.	MVA	Nominal Voltage (kV)		Impedance p.u.*		In Service Date			Status**
						Primary	Secondary	Resistance	Reactance	Year	Month	Day	
1	Cab115EB	1001	Cabras_1	1	80	115	13.2	0.005	0.1	90	1	1	1
2	Cab115EB	1001	Cabras_2	2	80	115	13.2	0.0049	0.0986	90	1	1	1
3	Ten345	2014	TenjoDsl	11	18	34.5	13.8	0.0038	0.0764	97	9	1	1
4	Cab115EB	1001	Cabras_3	12	38	115	13.8	0.0043	0.0861	95	9	30	1
5	Cab115EB	1001	Cabras_4	13	38	115	13.8	0.0043	0.0866	96	10	1	1
6	Pit345	2002	TEMES	15	44	34.5	13.8	0.0051	0.1017	96	10	1	1
7	Pit115B1	1005	MEC 8	16	56	115	13.8	0.006	0.121	99	1	1	1
8	Pit115B1	1005	MEC 9	17	56	115	13.8	0.0061	0.1212	96	10	1	1
9	Tan345B1	2201	Tangui_1	201	18	36.1	13.8	0.0034	0.0687	90	1	1	1
10	Tan345B1	2201	Tangui_2	202	18	36.1	13.8	0.0028	0.0563	90	1	1	1
11	DededT55	3204	DededDsl	203	5	13.8	4.2	0.0031	0.0627	90	1	1	1
12	DededT55	3204	DededDsl	204	5	13.8	4.2	0.0031	0.0627	90	1	1	1
13	Mar345B1	2204	Marbo CT	205	12	34.5	13.8	0.0038	0.0769	40	1	1	1

14	Ded345B1	2203	Ded CT#1	208	18	34.5	13.8	0.0039	0.0775	90	1	1	1
15	Ded345B1	2203	Ded CT#2	209	18	34.5	13.8	0.0391	0.0782	90	1	1	1
16	Yig345B1	2214	Yigo__CT	211	18	34.5	13.8	0.0037	0.075	90	1	1	0
17	Cab345	2001	Cab115EB	1001	60	34.5	115	0.0031	0.0617	90	1	1	1
18	Pit345	2002	Pit115B1	1005	60	34.5	115	0.0021	0.0802	2	9	1	1
19	Aga345	2101	Aga115	1101	60	34.5	115	0.0076	0.0607	90	1	1	1
20	Tam345B1	2104	Tam115B1	1103	60	34.5	115	0.0025	0.0788	90	1	1	1
21	Har345B3	2202	Har115B1	1201	112	34.5	115	0.003	0.1413	90	1	1	1
22	Har345B1	2219	Har115B1	1201	60	34.5	115	0.0075	0.0608	90	1	1	1
23	Cab345	2001	CbrsStUp	4001	5	34.5	4.2	0.003	0.0597	90	1	1	1
24	Piti T7	3001	Pit345	2002	8	13.8	34.5	0.0038	0.0756	90	1	1	1
25	Piti T8	3002	Pit345	2002	8	13.8	34.5	0.0038	0.0762	90	1	1	1
26	TalofT80	3003	Tal345	2003	10	13.8	34.5	0.0032	0.0639	90	1	1	1
27	Apra T70	3004	Apr345	2004	10	13.8	34.5	0.0032	0.0639	90	1	1	1
28	OroteT11	3005	Oro345	2005	10	13.8	34.5	0.0031	0.0628	95	11	1	1
29	OroteT12	3006	Oro345	2005	10	13.8	34.5	0.0032	0.0638	95	11	1	1
30	OroteT13	3012	Oro345	2005	10	13.8	34.5	0.0031	0.0629	95	11	1	1
31	VictrT42	6001	Vic345	2006	3	0.5	34.5	0.0021	0.0429	90	1	1	0
32	VictrT43	6002	Vic345	2006	1	0.5	34.5	0.0029	0.0576	90	1	1	0
33	VictrT44	6003	Vic345	2006	3	0.5	34.5	0.0022	0.0437	90	1	1	0
34	VictrT45	6004	Vic345	2006	3	0.5	34.5	0.0022	0.0434	90	1	1	0
35	CldST132	3007	CldSt345	2008	5	13.8	34.5	0.003	0.0609	90	1	1	1
36	PulanT95	3009	Pul345	2011	18	13.8	34.5	0.0041	0.0765	90	1	1	1
37	UmatT120	3011	Uma345	2012	18	13.8	34.5	0.0039	0.0776	97	9	1	1
38	NimtzTXX	3013	NimitzSu	2015	18	13.8	34.5	0	0.0766	97	9	1	0

39	Agana T9	3101	Aga345	2101	12	13.8	34.5	0.0054	0.0601	90	1	1	1
40	AganaT65	3102	Aga345	2101	15	13.8	34.5	0.0034	0.0689	90	1	1	1
41	BarriT75	3103	Bar345	2102	15	13.8	34.5	0.0034	0.069	90	1	1	1
42	RadBaT23	3104	RBa345B1	2103	8	13.8	34.5	0.0033	0.0651	90	1	1	0
43	RadBaT24	3105	RBa345B1	2103	8	13.8	34.5	0.0033	0.0655	90	1	1	1
44	TamunT50	3106	Tam345B1	2104	15	13.8	34.5	0.0035	0.0709	90	1	1	1
45	TamunT51	3108	Tam345B1	2104	15	13.8	34.5	0.0041	0.0829	90	1	1	1
46	TumonT60	3107	Tum345B1	2105	15	13.8	34.5	0.0037	0.0749	90	1	1	1
47	TumonT61	3109	Tum345B1	2105	15	13.8	34.5	0.0038	0.0769	90	1	1	1
48	AnigT100	3110	Ani345B1	2106	18	13.8	34.5	0.0041	0.0765	94	1	1	1
49	SanVT122	3113	SV345B1	2108	18	13.8	34.5	0.004	0.0749	94	1	1	1
50	Tan345B1	2201	TangoStr	5201	3	34.5	2.4	0.0033	0.0651	90	1	1	1
51	HarmnT21	3201	Har345B1	2219	18	13.8	34.5	0.0039	0.0743	90	1	1	1
52	HarmnT22	3202	Har345B1	2219	8	13.8	34.5	0.0031	0.0615	90	1	1	1
53	HarmnT44	3203	Har345B3	2202	8	13.8	34.5	0.0031	0.0629	90	1	1	0
54	DededT55	3204	Ded345B1	2203	15	13.8	34.5	0.0035	0.0699	90	1	1	1
55	MarboT14	3205	Mar345B1	2204	10	13.8	34.5	0.0031	0.0628	90	1	1	1
56	NCS T47	4201	NCS345	2208	4	4.2	34.5	0.0042	0.0841	90	1	1	1
57	PotsT110	3207	Pott345	2209	4	13.8	34.5	0.0038	0.0758	90	1	1	1
58	AnderT15	3208	And345B1	2210	20	13.8	34.4	0.0037	0.0748	90	1	1	1
59	AnderT16	3209	And345B1	2210	20	13.8	34.4	0.0037	0.0749	90	1	1	1
60	MacheT90	3210	Mac345B1	2211	15	13.8	34.5	0.0038	0.0766	90	1	1	1
61	PagaT115	3211	Pag345B1	2212	18	13.8	34.5	0.0041	0.0761	97	9	1	1
62	Yigo T30	3212	Yig345B1	2214	18	13.8	34.5	0.004	0.0752	90	1	1	1
63	GAA T105	3213	GAA345B1	2216	18	13.8	34.5	0.004	0.0756	90	1	1	1

64	GIAT Trm	4213	GIA345B1	2217	8	4.2	34.5	0.0035	0.0691	90	1	1	1

Note:

* pu impedance based on the transformer base MVA

** Status of transformer: 1= On-line, 2=Off-line, as indicated 101309 7pm.sav representing peak load condition

3.2 Transmission Lines

Transmission lines data listed in Table 3 and Table 4 are identified from PSLF model. Data in Table 3 describes the connectivity and electric parameters of the transmission line; data in Table 4 provides power flow rating and other information. Transmission line conductor data are listed in the Table 5, Table 6 and Table 7, describing conductors used in 115kV and 34.5kV transmission lines.

Table 3 – Transmission Line Data

No.	From Bus	Bus No.	To Bus	Bus No.	Nominal Voltage (kV)	Circuit No.	LENGTH	Series Resistance (pu)	Series Reactance (pu)	Total Charge Susceptance (pu)
1	ManenDsl	9	PulanT95	3009	13.8	1	0	0	0.0005	0
2	TalofDsl	10	TalofT80	3003	13.8	1	0	0	0.0005	0
3	OrteUnts	14	OroteT11	3005	13.8	1	0	0	0.0005	0
4	Mache_CT	210	MacheT90	3210	13.8	1	0	0	0.0005	0
5	Yigo__CT	211	Yigo T30	3212	13.8	1	0	0	0.0005	0
6	Cab115EB	1001	Pit115B1	1005	115	1	0.48	0.0005	0.0026	0.0004
7	Cab115EB	1001	Aga115	1101	115	1	7.2	0.0069	0.04	0.0056
8	Cab115EB	1001	Aga115	1101	115	2	7.2	0.0069	0.04	0.0056
9	Pit115B1	1005	Har115B1	1201	115	1	12.96	0.0115	0.0662	0.011
10	Aga115	1101	Tam115B1	1103	115	1	2.08	0.002	0.0104	0.0018
11	Tam115B1	1103	Har115B1	1201	115	1	4.54	0.0043	0.023	0.0039
12	Cab345	2001	Pit345	2002	34.5	1	0.3	0.0016	0.0076	0
13	Pit345	2002	Tenjotap	2017	34.5	1	3.65	0.0413	0.2136	0.0003

14	Pit345	2002	Oro345	2005	34.5	1	4.39	0.0433	0.2204	0.0004
15	Pit345	2002	Aga345	2101	34.5	1	5.66	0.0556	0.3013	0.0005
16	Pit345	2002	Ani345B1	2106	34.5	1	3.5	0.0375	0.1762	0.0003
17	Tal345	2003	Apr345	2004	34.5	1	6.9	0.1773	0.3705	0.0005
18	Apr345	2004	Oro345	2005	34.5	1	3.8	0.0405	0.1902	0.0003
19	Apr345	2004	Uma345	2012	34.5	1	13	0.1284	0.6507	0.0011
20	Apr345	2004	Tenjotap	2017	34.5	1	1.64	0.0174	0.0958	0.0001
21	Oro345	2005	Vic345	2006	34.5	1	0.1	0.002	0.0046	0
22	Oro345	2005	CldStTap	2007	34.5	1	0.43	0.011	0.025	0
23	Vic345	2006	CldStTap	2007	34.5	1	0.85	0.0216	0.0495	0
24	Pit345	2002	CldStTap	2007	34.5	1	3.53	0.0898	0.2131	0.0003
25	CldStTap	2007	CldSt345	2008	34.5	1	0.26	0.0069	0.0158	0
26	Pul345	2011	Tal345	2003	34.5	1	7.44	0.0704	0.3619	0.0007
27	Pul345	2011	Bar345	2102	34.5	1	7.85	0.0838	0.3837	0.0007
28	Ten345	2014	Tenjotap	2017	34.5	1	0.69	0.0074	0.0377	0
29	Aga345	2101	Bar345	2102	34.5	1	3.1	0.0318	0.139	0.0003
30	Aga345	2101	RBa345B1	2103	34.5	1	4.6	0.0419	0.2119	0.0004
31	Aga345	2101	Tam345B1	2104	34.5	1	2.33	0.0249	0.1122	0.0002
32	Aga345	2101	HafaTap	2110	34.5	1	2.1	0.0627	0.1184	0
33	Bar345	2102	GAA345B1	2216	34.5	1	4.6	0.0361	0.1554	0.0003
34	RBa345B1	2103	Mar345B1	2204	34.5	1	5.17	0.1163	0.2697	0.0004
35	Tam345B1	2104	Tum345B1	2105	34.5	1	1.68	0.0085	0.0167	0.0022
36	Tam345B1	2104	HafaTap	2110	34.5	1	0.19	0.0025	0.0018	0
37	HafaTap	2110	SV345B1	2108	34.5	1	1.46	0.014	0.0589	0.0001

38	Tum345B1	2105	Har345B3	2202	34.5	1	2.77	0.0141	0.0275	0.0038
39	Ani345B1	2106	Aga345	2101	34.5	1	2.47	0.0244	0.1237	0.0002
40	SV345B1	2108	Har345B3	2202	34.5	1	3.4	0.0211	0.0213	0.0027
41	Tan345B1	2201	Har345B1	2219	34.5	1	1.87	0.0103	0.019	0.0022
42	Tan345B1	2201	Har345B3	2202	34.5	2	1.81	0.01	0.0188	0.0021
43	Har345B3	2202	Ded345B1	2203	34.5	1	2.53	0.0293	0.149	0.0002
44	Ded345B1	2203	And345B1	2210	34.5	1	7.82	0.0666	0.0819	0.0106
45	Har345B1	2219	NCS345	2208	34.5	1	4.03	0.0997	0.226	0.0003
46	Har345B3	2202	Mac345B1	2211	34.5	1	1.81	0.0094	0.0097	0.0026
47	Har345B1	2219	Yig345B1	2214	34.5	1	6.17	0.1567	0.3595	0.0005
48	Har345B3	2202	Har345B1	2219	34.5	1	0	0	0.001	0
49	Ded345B1	2203	Mar345B1	2204	34.5	1	1.85	0.0187	0.0909	0.0002
50	NCS345	2208	Pott345	2209	34.5	1	1.41	0.0347	0.0788	0.0001
51	Pott345	2209	And345B1	2210	34.5	1	5.02	0.1241	0.2814	0.0002
52	Mac345B1	2211	Pag345B1	2212	34.5	1	3.96	0.0762	0.1712	0.0003
53	Mac345B1	2211	GAA345B1	2216	34.5	1	2.12	0.011	0.0114	0.003
54	Yig345B1	2214	And345B1	2210	34.5	1	3.08	0.0755	0.1728	0.0002
55	GAA345B1	2216	GIA345B1	2217	34.5	1	0.61	0.0052	0.0064	0.0008
56	GiatTap	2218	GIA345B1	2217	34.5	1	0.63	0.0053	0.0066	0.0008
57	GiatTap	2218	Har345B1	2219	34.5	1	2.97	0.0316	0.1487	0.0003
58	GiatTap	2218	Aga345	2101	34.5	1	3.21	0.0316	0.16	0

Table 4 – Transmission Line Data (Cont)

No.	From Bus	To Bus	Ratings				In Service Date			Status*
			MVA1	MVA2	MVA3	MVA4	Year	Month	Day	
1	ManenDsl	PulanT95	9999	9999	9999	9999	90	1	1	1
2	TalofDsl	TalofT80	9999	9999	9999	9999	90	1	1	1
3	OrteUnts	OroteT11	9999	9999	9999	9999	95	11	1	1
4	Mache_CT	MacheT90	9999	9999	9999	9999	90	1	1	1
5	Yigo__CT	Yigo T30	9999	9999	9999	9999	40	1	1	1
6	Cab115EB	Pit115B1	136	181	136	181	90	1	1	1
7	Cab115EB	Aga115	136	181	136	181	90	1	1	1
8	Cab115EB	Aga115	136	181	136	181	90	1	1	1
9	Pit115B1	Har115B1	136	181	136	181	90	1	1	1
10	Aga115	Tam115B1	136	181	136	181	90	1	1	1
11	Tam115B1	Har115B1	136	181	136	181	90	1	1	1
12	Cab345	Pit345	81	108	81	108	90	1	1	1
13	Pit345	Tenjotap	41	54	41	54	90	1	1	1
14	Pit345	Oro345	41	54	41	54	90	1	1	1
15	Pit345	Aga345	22	29	22	29	90	1	1	1
16	Pit345	Ani345B1	41	54	41	54	90	1	1	1
17	Tal345	Apr345	23	31	23	31	90	1	1	1
18	Apr345	Oro345	41	54	41	54	90	1	1	1
19	Apr345	Uma345	41	54	41	54	90	1	1	1
20	Apr345	Tenjotap	41	54	41	54	90	1	1	1
21	Oro345	Vic345	22	29	22	29	90	1	1	1
22	Oro345	CldStTap	22	29	22	29	90	1	1	1
23	Vic345	CldStTap	22	29	22	29	90	1	1	0
24	Pit345	CldStTap	22	29	22	29	90	1	1	1
25	CldStTap	CldSt345	22	29	22	29	90	1	1	1
26	Pul345	Tal345	41	54	41	54	90	1	1	1
27	Pul345	Bar345	41	54	41	54	90	1	1	1
28	Ten345	Tenjotap	41	54	41	54	97	9	1	1
29	Aga345	Bar345	41	54	41	54	90	1	1	1
30	Aga345	RBa345B1	22	29	22	29	90	1	1	1

31	Aga345	Tam345B1	41	54	41	54	90	1	1	1
32	Aga345	HafaTap	22	29	22	29	97	1	1	0
33	Bar345	GAA345B1	41	54	41	54	40	1	1	1
34	RBa345B1	Mar345B1	22	29	22	29	90	1	1	1
35	Tam345B1	Tum345B1	41	54	41	54	90	1	1	1
36	Tam345B1	HafaTap	31	42	31	42	96	1	1	1
37	HafaTap	SV345B1	41	54	41	54	96	1	1	1
38	Tum345B1	Har345B3	41	54	41	54	90	1	1	1
39	Ani345B1	Aga345	41	54	41	54	90	1	1	1
40	SV345B1	Har345B3	41	54	41	54	96	1	1	1
41	Tan345B1	Har345B1	41	54	41	54	90	1	1	1
42	Tan345B1	Har345B3	41	54	41	54	90	1	1	1
43	Har345B3	Ded345B1	41	54	41	54	90	1	1	1
44	Ded345B1	And345B1	31	42	31	42	90	1	1	1
45	Har345B1	NCS345	22	29	22	29	90	1	1	1
46	Har345B3	Mac345B1	41	54	41	54	90	1	1	1
47	Har345B1	Yig345B1	22	29	22	29	90	1	1	1
48	Har345B3	Har345B1	90	120	90	120	90	1	1	0
49	Ded345B1	Mar345B1	41	54	41	54	90	1	1	1
50	NCS345	Pott345	22	29	22	29	90	1	1	1
51	Pott345	And345B1	22	29	22	29	90	1	1	1
52	Mac345B1	Pag345B1	41	54	41	54	40	1	1	1
53	Mac345B1	GAA345B1	41	54	41	54	40	1	1	1
54	Yig345B1	And345B1	22	29	22	29	90	1	1	1
55	GAA345B1	GIA345B1	31	42	31	42	40	1	1	1
56	GiatTap	GIA345B1	31	42	31	42	40	1	1	1
57	GiatTap	Har345B1	41	54	41	54	40	1	1	1
58	GiatTap	Aga345	22	29	22	29	40	1	1	0

Table 5 – 115kV Transmission Line Conductor Data

RECORD NO.	FROM	BUS NO.	TO	BUS NO.	CONDUCTOR TYPE	CONFIG. TYPE	CURRENT RATING (AMPS)	MVA RATING	LENGTH (FEET)
1	CABRAS H342/H346	1001	AGANA H402/H403	1101	927 MCM AL	A	908	181	38014.00
					927 MCM AL	B	908	181	
2	CABRAS H322/H326	1001	AGANA H401/H404	1101	927 MCM AL	A	908	181	38014.00
					927 MCM AL	B	908	181	
3	AGANA H403/H404	1101	TAMUNING H602	1103	927 MCM AL	L	908	181	10993.00
					927 MCM AL	I	908	181	
					927 MCM AL	ST1	908	181	
4	TAMUNING H612	1103	HARMON H501	1201	927 MCM AL	L	908	181	23952.00
					927 MCM AL	I	908	181	
					927 MCM AL	ST1	908	181	
5	CABRAS H362/H366	1001	PITI H760/H750	1005	927 MCM AL		908	181	2534.00
6	PITI H710/760	1005	HARMON H502	1201	927 MCM AL		908	181	68619.44
115 KV NEW ADDITIONAL LINES									

Table 6 – 34.5kV Transmission Line Conductor Data

RECORD NO.	FROM	BUS NO.	TO	BUS NO.	CONDUCTOR TYPE	CONFIG. TYPE	CURRENT RATING (AMPS)	MVA RATING	LENGTH (FEET)
1	AGANA X40	2101	ANIGUA X112	2113	927 MCM AL	G	908	54	13060.00
2	AGANA X45	2101	RAD. BARRIGADA X55	2103	927 MCM AL		908	54	12936.00
					4/0 CU	E	480	29	11374.00
3	AGANA X53	2101	TAMUNING X209	2104	927 MCM AL	M	908	54	12326.00
4	AGANA X54	2101	BARRIGADA X246	2102	927 MCM AL	M	908	54	16211.00
					927 MCM AL	E (dbl. Ckt.)	908	54	
					600 MCM AL	UG (2C/PH)	700	42	450.00
5	APRA X36	2004	OROTE X33	2005	927 MCM AL	E	908	54	20064.00
6	APRA X37	2004	TENJO TAP		927 MCM AL	L	908	54	8638.00
7	APRA X39	2004	UMATAC X250	2012	927 MCM AL		908	54	68640.00
8	BARRIGADA X245	2102	GAA X173	2216	927 MCM AL	E	908	54	18998.00
					600 MCM AL	UG (2C/PH)	700	42	5505.00
9	CABRAS X15	2001	PITI X6	2002	2-927 MCM AL	C	1816	108	1597.00
10	CLD STORAGE TAP	2007	CLD STORAGE	2008	4/0 CU	F	480	29	1403.00
11	DEDEDO X222	2203	MARBO X-67	2205	927 MCM AL	J	908	54	9761.00
12	DEDEDO X150/155	2203	ANDERSEN X71	2210	600 MCM AL	UG (2C/PH)	700	42	41286.00
13	GAA X174	2216	GIAT X175	2217	600 MCM AL	UG (2C/PH)	700	42	3203.00
14	GIAT X178	2217	GIAT TAP	2218	600 MCM AL	UG (2C/PH)	700	42	3316.28
15	HARMON X80	2202	SAN VITORES X260	2108	1000 KCMIL AL	UG (2C/PH)	908	54	8715.00
					600 MCM AL	UG (3C/PH)	1050	63	8803.00
					927 MCM AL		908	54	410.00
16	HARMON X81	2219	GIAT TAP	2218	927 MCM AL		908	54	15689.96
17	HARMON X82	2219	YIGO X160	2214	4/0 CU	E	480	29	32584.00
18	HARMON X87	2219	NCS FINEGAYAN	2208	4/0 CU	E	480	29	21294.00
19	HARMON X88	2202	DEDEDO X151/154	2203	927 MCM AL	M	908	54	13350.00
20	HARMON X98	2202	MACHECHE X130	2211	1000 KCMIL AL	UG (2C/PH)	908	54	9540.00
21	MACHECHE X133	2211	GAA X170	2216	1000 KCMIL AL	UG (2C/PH)	908	54	11196.00
22	MACHECHE X134	2211	PAGAT 180	2212	927 MCM AL	E	908	54	21831.00
					600 MCM AL	UG (2C/PH)	700	42	220.00
23	NCS FINEGAYAN	2208	POTTS JUNCTION	2209	4/0 CU	E	480	29	7422.00
24	OROTE X34	2005	VICTOR DOCKS	2006	4/0 CU	E	480	29	416.00
25	OROTE X35	2005	CLD STORAGE TAP	2007	4/0 CU	F	480	29	2270.00
26	PITI X20	2002	CLD STORAGE TAP	2007	4/0 CU	E	480	29	18622.00
27	PITI X21	2002	OROTE X31	2005	927 MCM AL	E	908	54	23194.00
28	PITI X22	2002	TENJO TAP	2017	927 MCM AL	D	908	54	19272.00
29	PITI X23	2002	AGANA X43	2101	927 MCM AL	E	908	54	29884.00
					4/0 CU		480	29	
30	PITI X24	2002	ANIGUA X110	2113	927 MCM AL	E	908	54	18568.00
31	POTTS JUNCTION	2209	ANDERSEN X73	2210	4/0 CU	E	480	29	26511.00
32	PULANTAT X143	2011	TALOFOFO X123	2003	927 MCM AL	M	908	54	39292.00
					600 MCM AL	UG (2C/PH)	700	42	537.00
33	PULANTAT X140	2011	BARRIGADA X247	2102	927 MCM AL	M	908	54	30690.00
34	R. BARRIGADA X56	2103	MARBO X65	2204	4/0 CU	E	480	29	27306.00
35	SAN VIT	2108	HFADAITP	2110	927 MCM AL		908	54	7709.00
36	TALOFOFO X124	2003	APRA X38	2004	336 MCM AL	H	513	31	36384.00
37	TAMUNING X210	2104	TUMON X226	2105	1000 KCMIL AL	UG (2C/PH)	908	54	8850.00

Table 7 – 34.5kV Transmission Line Conductor Data (Cont)

38	TAMUNING X214	2104	HFADAITP	2110	600 MCM AL	UG (2C/PH)	700	42	1003.00
41	TANGUISSON X101	2201	HARMON X86	2219	1000 KCMIL AL	UG (2C/PH)	908	54	9248.00
					927 MCM AL				607.00
42	TANGUISSON X103	2201	HARMON X93	2202	1000 KCMIL AL	UG (2C/PH)	908	54	8926.00
					927 MCM AL				613.00
43	TENJOVIS	2014	TENJO TAP	2017	927 MCM AL		908	54	3654.00
44	TUMON X227	2105	HARMON X97	2202	1000 KCMIL AL	UG (2C/PH)	908	54	14600.00
45	VICTOR DOCKS	2006	CLD STORAGE TAP	2007	4/0 CU	F	480	29	4484.00
46	YIGO X161	2214	ANDERSON X70	2210	4/0 CU	E	480	29	16012.00
34.5 KV TRANSMISSION LINES OUT OF SERVICE									
	AGANA X41	2101	GIAT TAP	2218	927 MCM AL		908	54	16949.00
	AGANA X42	2101	HFADAITP	2110	4/0 CU	K	480	29	11088.00
	MARBO X66	2204	WILSON HOME TAP	2206	4/0 CU	E	480	29	0.00
	WILSON HOME TAP	2206	ANDERSON X71	2210	4/0 CU	J	480	29	27865.00

3.3 Shunt Capacitors

Fixed Shunt Capacitors data are listed in Table 8.

Table 8 – Shunt Capacitors

No.	Bus Name	Bus No.	Voltage (kV)	Susceptance (pu) *	kVAR	Status**	In Service Date		
							Year	Month	Day
1	TalofT80	3003	13.8	0.03	3	1	90	1	1
2	Apra T70	3004	13.8	0.018	1.8	0	90	1	1
3	OroteT11	3005	13.8	0.012	1.2	0	90	1	1
4	OroteT12	3006	13.8	0.012	1.2	0	90	1	1
5	PulanT95	3009	13.8	0.009	0.9	0	90	1	1
6	Agana T9	3101	13.8	0.004	0.4	0	90	1	1
7	AganaT65	3102	13.8	0.036	3.6	0	90	1	1
8	BarriT75	3103	13.8	0.027	2.7	0	90	1	1
9	RadBaT23	3104	13.8	0.012	1.2	0	90	1	1
10	RadBaT24	3105	13.8	0.012	1.2	0	90	1	1
11	TamunT50	3106	13.8	0.009	0.9	0	90	1	1
12	TumonT60	3107	13.8	0.0045	0.45	0	90	1	1
13	TamunT51	3108	13.8	0.0225	2.25	0	90	1	1
14	TumonT61	3109	13.8	0.045	4.5	1	90	1	1
15	AnigT100	3110	13.8	0.018	1.8	0	90	1	1
16	HarmnT21	3201	13.8	0.009	0.9	0	90	1	1
17	HarmnT22	3202	13.8	0.009	0.9	0	90	1	1
18	HarmnT44	3203	13.8	0.012	1.2	0	90	1	1
19	DededT55	3204	13.8	0.018	1.8	0	90	1	1
20	MarboT14	3205	13.8	0.009	0.9	0	90	1	1
21	AnderT15	3208	13.8	0.06	6	0	90	1	1
22	AnderT16	3209	13.8	0.03	3	0	90	1	1
23	MacheT90	3210	13.8	0.0495	4.95	0	90	1	1
24	Yigo T30	3212	13.8	0.03	3	1	40	1	1
25	UmatT120	3011	13.8	0.0045	0.45	0	40	1	1
26	PagaT115	3211	13.8	0.009	0.9	0	40	1	1
27	SanVT122	3113	13.8	0.03	3	1	90	1	1

Note:

* pu susceptance based on the system base MVA = 100 MVA

** Status of shunt capaccitor: 1= On-line, 2=Off-line, status of capacitor from 101309 7pm.sav representing peak load condition

4. Distribution System Data

Distribution system equipments data are listed in this section, including data for distribution feeders, distribution transformers and secondary wires.

4.1 Distribution Feeders

Distribution feeder data are listed in Table 9. Distribution feeder conductor data are listed in Table 10 and Table 11. Information about shunt capacitors connecting to distribution feeders are listed in Table 12.

Table 9 – Distribution Feeders

Feeder	Substation	Total feeder Length (mi)	Collection method	Connected KVA
P-087	Dededo	45.5	elog	34852
P-088	Dededo	19.3	elog	26665
P-089	Dededo	15.2	elog	14830
P-330	Yigo	33.3	quantum	16178
P-331	Yigo	37.8	quantum	35767
P-332	Yigo	9.1	quantum	20663
P-270	Macheche	7.4	elog	18166
P-271	Macheche	11.5	elog	24046
P-272	Macheche	3.8	elog	7387
P-046	Harmon	6.3	elog	5717
P-111	Harmon	4.3	elog	15253
P-240	Tumon	3.8	elog	18847
P-241	Tumon	1.3	elog	15076
P-242	Tumon	4.2	elog	29989
P-243	Tumon	1.9	quantum	28250
P-244	Tumon	3.2	quantum	9390
P-245	Tumon	6.2	quantum	29867
P-246	Tumon	1.5	quantum	4022
P-400	San Vitores	3.2	quantum	4917
P-401	San Vitores	1.7	quantum	2950
P-402	San Vitores	1	quantum	4938

P-403	San Vitores	3.3	quantum	25251
P-310	GAA	6.1	quantum	12518
P-311	GAA	13	quantum	18397
P-312	GAA	6.48	quantum	8713
P-313	GAA	0		
P-201	Tamuning	5.1	elog	14181
P-202	Tamuning	5.4	quantum	17825
P-203	Tamuning	7.5	quantum	27355
P-204	Tamuning	4.9	quantum	17030
P-205	Tamuning	4.9	elog	16702
P-206	Tamuning	1.9	elog	6768
P-210	Barrigada	11.7	elog	23022
P-212	Barrigada	15.3	elog	17475
P-213	Barrigada	9.7	elog	14008
P-250	Agana	30.3	elog	31869
P-251	Agana	5.1	elog	14266
P-252	Agana	7	elog	13375
P-253	Agana	14	elog	20453
P-280	Anigua	11	quantum	10986
P-281	Anigua	3.9	quantum	11047
P-282	Anigua	3.7	quantum	17868
P-283	Anigua	9.6	quantum	12325
P-340	Umatac	26.4	quantum	21020
P-341	Umatac	11	quantum	5297
P-322	Pagat	26.6	quantum	20663
P-323	Pagat	19	quantum	21001
P-260	Talofofo	8.1	elog	20983
P-261	Talofofo	22.7	elog	12932
P-262	Talofofo	21	elog	11754
P-290	Pulantat	4.3	quantum	4350
P-292	Pulantat	1.1	quantum	475
P-294	Pulantat	23.6	quantum	20029
P-298	Pulantat	4	quantum	6167
P-301	Pulantat	10.1	quantum	5171

P-003	Piti	4.9	elog	8133
P-005	Piti	9.1	elog	8775
P-007	Piti	3.7	elog	3258
P-220	Apra	5.3	elog	2590
P-221	Apra	17.7	elog	22474
P-222	Apra	3.3	elog	3015
P-223	Apra	7.9	elog	19113
P-067	Andersen	11.9	elog	17005

Table 10 – Overhead Distribution Feeder Conductor Data

Size	Conductor	Bare or Covered	Number of Stands	Ampacity (Amps)	Code Word
927.2	All Aluminum Alloy Conductor (AAAC)	Bare	37 Strands	908	Greely
336.4	All Aluminum Alloy Conductor (AAAC)	Bare	19 Strands	513	Tulip
2/0	All Aluminum Alloy Conductor (AAAC)	Bare	7 Strands	296	Anaheim
#2	All Aluminum Alloy Conductor (AAAC)	Bare	7 Strands	191	Ames
#4/0	Copper Wire	Bare	7 Strands	480	
#2/0	Copper Wire	Bare	7 Strands	355	

Table 11 – Underground Distribution Feeder Conductor Data

Size	Conductor	Loading	Number of Stands	Ampacity (Amps)	Code Word	Cable Type
500 MCM	Copper Conductor	133%	37 Strands	472	Daumier-VIP	15kV Primary Underground Cable XLPE with Concentric Neutral
2/0	Aluminum Conductor	133%	19 Strands			15kV Primary Underground Cable XLPE with Concentric Neutral
2	Aluminum Conductor	133%	7 Strands			15kV Primary Underground Cable XLPE with Concentric Neutral

Table 12 – Shunt Capacitors in Distribution System

Capacitor Sizes are 450 kVAR, 900 kVAR, and 1350 kVAR
Capacitors use 150 kVAR Capacitor Banks
Capacitors are Shunt Type
Capacitors are Fixed

4.2 Distribution Transformers

Number of distribution transformers in each kVA capacity level are listed for per-feeder basis in Table 13 and Table 14.

Table 13 – Single Phase Distribution Transformers

Type	Single Phase									
kVA	15	25	37.5	50	75	100	166.7	450	247	Total
P-003	2	5	3	2	0	0	0	0	0	12
P-005	3	11	22	13	9	11	0	0	0	69
P-007	2	7	5	2	3	8	0	0	0	27
P-067	9	13	13	27	13	2	0	0	0	77
P-046	2	16	6	6	4	2	0	0	0	36
P-111	1	1	5	3	2	2	0	0	0	14
P-087	21	110	57	105	93	43	1	0	0	430
P-088	3	10	24	33	68	72	2	0	0	212
P-089	6	21	24	59	32	22	0	0	0	164
P-201	2	3	3	10	12	27	0	0	0	57
P-202	1	6	8	3	6	10	1	0	0	35
P-203	0	2	2	11	14	36	1	0	0	66
P-204	0	1	2	14	20	32	1	0	0	70
P-205	1	3	5	5	11	18	0	0	0	43
P-206	3	0	1	2	13	3	0	0	0	22
P-210	6	14	23	33	17	29	0	0	0	122
P-212	2	24	26	43	28	30	0	0	0	153
P-213	3	9	13	6	3	7	0	0	0	41
P250	2	47	82	83	51	43	2	0	0	310

P251	1	7	3	15	9	12	2	0	0	49
P252	1	10	11	25	26	11	0	0	0	84
P253	3	22	19	48	36	27	0	1	0	156
P-240	0	2	4	3	4	16	2	0	0	31
P-241	0	0	0	0	1	0	0	0	0	1
P-242	0	2	10	0	2	12	0	0	0	26
P-243	0	0	0	0	0	0	0	0	0	0
P-244	4	0	1	1	2	1	0	0	0	9
P-245	8	12	2	12	7	18	0	0	0	59
P-246	0	0	5	0	0	3	2	0	0	10
P-270	1	4	4	8	20	45	0	0	0	82
P-271	2	14	7	15	14	24	3	0	0	79
P-272	1	2	3	12	8	13	0	0	0	39
P-310	0	8	2	3	16	21	2	0	0	52
P-311	2	14	14	20	17	28	1	0	0	96
P-312	0	8	2	9	10	4	0	0	0	33
P400	0	1	2	2	8	19	1	0	0	33
P401	0	0	0	0	4	2	0	0	0	6
P402	0	0	1	1	0	2	0	0	0	4
P403	0	0	4	0	0	3	0	0	0	7
P-220	1	28	4	12	4	6	0	0	0	55
P-221	1	19	20	39	27	45	2	0	0	153
P-222	1	0	2	3	1	0	0	0	0	7
P-223	0	3	12	15	19	24	0	0	0	73
P-260	3	11	2	8	3	8	0	0	0	35
P-261	3	49	54	50	19	19	0	0	0	194
P-262	12	38	20	35	14	23	0	0	0	142

P-280	4	12	11	6	11	24	0	0	0	68
P-281	1	2	3	3	3	3	0	0	0	15
P-282	1	2	2	4	0	8	0	0	0	17
P-283	1	13	24	38	40	37	0	0	1	154
P-290	0	0	0	0	3	3	0	0	0	6
P-292	0	0	0	0	0	0	0	0	0	0
P-294	6	43	44	52	45	36	2	0	0	228
P-298	0	1	0	0	0	1	0	0	0	2
P-301	3	28	14	19	3	10	0	0	0	77
P-322	17	45	36	59	33	58	0	0	0	248
P-323	5	31	17	50	24	25	2	0	0	154
P-330	15	68	48	89	21	31	0	0	0	272
P-331	11	45	58	98	68	68	2	0	0	350
P-332	3	19	10	31	4	6	0	0	0	73
P-340	28	71	39	35	26	25	0	0	0	224
P-341	4	31	12	18	4	4	0	0	0	73
Total	212	968	850	1298	955	1122	29	1	1	5436

Table 14 – Three Phase Distribution Transformers

Type	**Three Phase**																			
KVA	38	45	62	75	100	113	150	167	200	225	300	500	600	750	1000	1500	2000	2728	3000	Total
P-003	0	2	0	1	0	0	4	0	0	6	3	1	0	3	0	0	1	0	0	21
P-005	0	1	0	1	0	0	3	0	0	1	3	0	0	2	2	0	0	0	0	13
P-007	0	2	0	1	0	0	1	0	0	1	2	1	0	0	0	0	0	0	0	8
P-067	0	1	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	0	0	6

P-046	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	3
P-111	0	0	0	0	0	0	2	0	0	3	3	3	0	2	2	5	0	0	0	20
P-087	0	4	0	10	0	0	21	0	0	8	9	3	0	1	1	0	0	0	0	57
P-088	0	2	0	8	0	0	9	0	0	7	10	8	0	0	0	0	0	0	0	44
P-089	0	1	0	3	0	0	5	0	0	0	3	2	0	0	0	0	0	1	0	15
P-201	0	0	0	2	0	0	8	0	0	9	10	3	0	1	1	0	0	0	0	34
P-202	0	0	0	3	0	0	11	0	1	12	14	2	1	1	1	0	1	0	0	47
P-203	0	0	0	9	0	0	11	0	0	11	15	2	0	2	4	1	2	0	0	57
P-204	0	0	0	2	0	0	6	0	0	6	7	1	0	3	0	0	2	0	0	27
P-205	0	1	0	4	0	0	7	1	0	2	9	1	0	2	0	3	1	0	0	31
P-206	0	0	0	1	0	0	4	0	0	6	6	3	0	1	0	0	0	0	0	21
P-210	0	1	0	1	0	0	13	0	0	5	10	2	0	7	3	0	0	0	0	42
P-212	0	1	0	2	0	0	7	0	0	5	6	3	0	2	1	0	0	0	0	27
P-213	0	0	0	3	0	0	12	0	0	3	7	6	0	2	1	1	0	0	0	35
P250	0	2	0	6	0	0	16	0	0	9	19	1	0	3	1	0	0	0	0	57
P251	0	0	0	4	0	0	5	0	0	8	14	4	0	0	0	1	0	0	0	36
P252	0	0	0	1	0	0	4	0	0	7	4	0	0	2	1	0	0	0	0	19
P253	0	1	0	2	0	0	12	0	0	12	5	4	0	3	0	0	0	0	0	39
P-240	0	0	0	1	0	0	3	0	0	2	9	6	0	1	2	3	1	0	0	28
P-241	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	5	0	0	9
P-242	0	0	0	1	0	0	2	0	0	10	8	8	0	1	1	1	8	0	0	40
P-243	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	1	0	0	5
P-244	0	1	0	2	0	0	10	0	0	5	5	2	0	0	0	0	0	0	0	25
P-245	0	4	0	11	0	0	15	0	0	18	18	7	0	1	2	0	1	0	0	77
P-246	0	0	0	0	0	0	3	0	0	2	1	0	0	0	0	0	1	0	0	7
P-270	0	0	0	3	0	0	4	0	0	2	0	2	0	2	0	1	3	0	0	17
P-271	0	0	0	14	0	0	16	1	0	7	15	10	0	2	1	1	0	0	0	67

P-272	0	0	0	0	0	0	3	0	0	0	5	0	0	1	0	0	0	0	0	9
P-310	0	0	0	2	0	0	5	0	0	2	8	8	0	0	0	0	0	0	0	25
P-311	0	1	0	6	0	0	12	1	0	9	6	8	0	2	0	0	0	0	0	45
P-312	0	0	0	1	0	0	3	0	0	6	2	3	0	1	0	0	1	0	0	17
P400	0	0	0	0	0	0	1	0	0	2	1	0	0	0	1	0	0	0	0	5
P401	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	2
P402	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2	0	0	4
P403	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	10	0	0	14
P-220	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
P-221	0	3	0	5	0	0	3	0	0	3	10	3	0	4	1	1	0	0	0	33
P-222	0	0	0	4	0	0	4	0	0	3	3	0	0	0	0	0	0	0	0	14
P-223	0	0	0	1	0	0	3	0	0	1	3	1	0	3	1	3	2	0	0	18
P-260	0	0	0	2	0	0	1	0	0	2	1	0	0	0	0	0	0	0	0	6
P-261	0	0	0	4	0	3	1	0	0	1	6	0	0	0	0	0	0	0	0	15
P-262	0	0	0	11	0	0	3	0	0	3	2	0	0	1	0	0	0	0	0	20
P-280	0	3	0	7	0	0	3	0	0	7	2	0	0	1	0	0	0	0	0	23
P-281	0	1	0	2	0	0	5	0	0	7	9	0	0	1	1	2	0	0	0	28
P-282	0	1	0	5	0	0	6	0	0	16	18	2	0	0	3	1	0	0	0	52
P-283	0	1	0	6	0	0	4	0	0	8	3	0	0	1	0	0	0	0	0	23
P-290	0	3	0	1	0	0	2	0	0	1	1	2	0	2	0	0	0	0	0	12
P-292	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2
P-294	0	0	0	2	0	0	7	0	0	4	5	5	0	1	0	0	0	0	0	24
P-298	0	2	0	0	0	0	3	0	0	0	0	5	0	0	3	0	0	0	0	13
P-301	0	0	0	0	0	0	1	0	0	2	1	2	0	0	0	0	0	0	0	6
P-322	0	2	0	7	0	0	5	0	0	2	6	2	0	1	0	0	0	0	0	25
P-323	0	1	0	10	0	0	11	0	0	7	10	5	0	1	3	0	0	0	0	48
P-330	0	0	0	2	0	0	1	0	0	1	5	0	0	1	0	0	0	0	0	10

P-331	0	2	0	9	0	0	15	0	0	9	13	4	0	1	1	1	0	0	0	55
P-332	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
P-340	0	1	0	10	0	11	3	0	0	2	2	2	0	1	2	0	0	0	0	34
P-341	0	0	0	4	0	0	1	0	0	4	0	0	0	0	1	0	0	0	0	10
Total	0	45	0	198	0	14	325	3	1	271	342	139	1	68	43	33	45	1	0	1529

Distribution transformer losses are listed in Table 15. Both No Load and Full Load Losses are typical value for transformers in the same class of voltage and kVA capacity. GPA shall update the data with specific values provided by the transformer manufacture.

Table 15 – Distribution Transformer Losses Data

Type	kVA	Primary Voltage (kV)	Secondary Voltage (V)	Typical Losses (W)		Remark
				NO Load Loss	Total Loss	
Single Phase	15	13.8	120/240	84	305	
	25	13.8	120/240	118	437	
	37.5	13.8	120/240	166	585	
	50	13.8	120/240	185	735	
	75	13.8	120/240	285	1050	
	100	13.8	120/240	355	1300	
	166.7	13.8	120/240	500	2160	
	450	13.8	120/240	1035	5215	extrapolation
	247	13.8	120/240	610	3490	
Three Phase	38	13.8	120/208 or 277/480	360	1350	extrapolation
	45	13.8	120/208 or 277/480	360	1350	extrapolation
	62	13.8	120/208 or 277/480	360	1350	extrapolation

	75	13.8	120/208 or 277/480	360	1350	
	100	13.8	120/208 or 277/480	472	1646	extrapolation
	113	13.8	120/208 or 277/480	530	1800	
	150	13.8	120/208 or 277/480	560	2250	
	167	13.8	120/208 or 277/480	633	2488	extrapolation
	200	13.8	120/208 or 277/480	773	2950	extrapolation
	225	13.8	120/208 or 277/480	880	3300	
	300	13.8	120/208 or 277/480	1050	4300	
	500	13.8	120/208 or 277/480	1600	6800	
	600	13.8	120/208 or 277/480	1680	8160	extrapolation
	750	13.8	120/208 or 277/480	1800	10200	
	1000	13.8	120/208 or 277/480	2100	12500	
	1500	13.8	120/208 or 277/480	2900	19400	
	2000	13.8	120/208 or 277/480	4800	26600	
	2728	13.8	120/208 or 277/480	5507	30302	extrapolation
	3000	13.8	120/208 or 277/480	5771	31686	extrapolation

Note:

* Typical loss data from Electric Power distribution System Engineering by Turan Gonen, 1986

For those transformers of kVA rating that are not listed as typical rating, extrapolation of typical loss data are calculated and filled in the table.

Minimum impedance data for distribution transformers are listed in Table 16.

Table 16 – Minimum Impedance of Distribution Transformers

Minimum Impedance for 10-25 kVA Pole Mounted Transformers is 1.6%
Minimum Impedance for 50-167 kVA Pole Mounted Transformers is 1.8%
Minimum Impedance for 25 kVA Single Phase Pad-Mounted Transformer is 1.6%
Minimum Impedance for 50-100 kVA Single Phase Pad-Mounted Transformers is 1.8%

4.3 Secondary Wires

Secondary wire data are listed in Table 17 and Table 18.

Table 17 – Overhead Secondary Wires 600V

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9.0 TABLE A

PHASE CONDUCTOR			NEUTRAL-MESSENGER			WEIGHT PER 1000 FEET (Lbs.)	AMPACITY (AMPS)
Size (AWG)	Stranding	Cover Thick (MILS)	Size (AWG)	Stranding	Min. Ultimate Strength (lbs.)	VIP	VIP
DUPLEX							
8	7	45	8	7	610	115.8	84
6	7	45	6	7	959	179.1	110
TRIPLEX							
8	7	45	8	7	610	180.6	84
6	7	45	6	7	959	277.2	110
4	7	45	4	7	1505	429.6	145
2	7	45	4	7	1505	593.7	195
2	7	45	2	7	2360	669.7	195
1/0	19	60	1/0	7	3705	1070.6	260
2/0	19	60	2/0	7	4765	1338.7	300
4/0	19	60	4/0	7	7479	2099.4	395
QUADRUPLEX							
6	7	45	6	7	959	375.3	95
4	7	45	4	7	1505	580.0	125
2	7	45	2	7	2360	902.3	165
1/0	19	60	1/0	7	3705	1443.1	225
2/0	19	60	2/0	7	4765	1802.7	260

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Table 18 – Underground Secondary Wires 600V

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8.5 The Supplier shall have adequate work and inspection instructions for handling, interim storage, preservation, packaging, and shipping to protect the quality of the cable and prevent damage, loss and deterioration.

9.0 TABLE A

PHASE CONDUCTOR			NEUTRAL			DIMENSIONS		WEIGHT PER 1000 FEET (Lbs.)	AMPACITY (AMPS) In Ducts	
Size (AWG or KCMIL)	No. of Strands	Insulation Thickness (MILS)	Size (AWG Or KCMIL)	No. of Strands	Insulation Thickness (MILS)	Single Phase Conductor	Complete Cable (Inches)	VIP	90°C	75°C
SINGLE										
12	Solid	45	-	-	-	N/A	.17		-	20
10	Solid	45	-	-	-	N/A	.19		-	30
8	Solid	60	-	-	-	N/A	.25		50	45
12	7	45	-	-	-	N/A	.18		-	20
10	7	45	-	-	-	N/A	.21		-	30
8	7	60	-	-	-	N/A	.27		50	45
6	7	60	-	-	-	N/A	.31		70	65
4	7	60	-	-	-	N/A	.36		90	85
2	7	60	-	-	-	N/A	.42		120	115
1	19	80	-	-	-	N/A	.50		140	130
1/0	19	80	-	-	-	N/A	.54		155	155
2/0	19	80	-	-	-	N/A	.58		185	175
4/0	19	80	-	-	-	N/A	.69		235	230
250	37	95	-	-	-	N/A	.76		270	255
500	37	95	-	-	-	N/A	.99		405	380
750	61	110	-	-	-	N/A	1.21		500	475
1000	61	110	-	-	-	N/A	1.36		585	545
TRIPLEX										
2	7	60	2	7	60	0.403	1.128	297	120	
2/0	19	80	2/0	19	80	0.566	1.223	573	180	
4/0	19	80	4/0	19	80	0.672	1.452	846	240	
QUADRUPLEX										
2/0	19	80	2/0	19	80	0.566	1.366	764	170	
4/0	19	80	4/0	19	80	0.672	1622	1128.8	225	

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Appendices

No Appendix for this document.