

### A. Data Handbook

Data for Tonga Power Limited's power system are provided in this handbook for generation, transmission and distribution. Data that were missing or assumed are noted accordingly.

#### A.1 Generation

Data for Tonga Power Diesel Generators 1 through 8 are given in the following table.

**Table 1. Popua Power Station Generator Data**

Bus-No	Generator Name	Model	Base Voltage (kV)	Base kVA	PMax (kW)	Speed (rpm)	Year in Service	Status*
PS – 1	UNIT 1	CAT 3516B	11	1,525	1,400	1,500	Unknown	1
PS – 1	UNIT 2	CAT 3516B	11	1,525	1,400	1,500	Unknown	1
PS – 1	UNIT 3	CAT 3516B	11	1,525	1,400	1,500	Unknown	1
PS – 1	UNIT 4	CAT 3516B	11	1,525	1,400	1,500	Unknown	1
PS – 1	UNIT 5	CAT 3516B	11	1,525	1,400	1,500	Unknown	1
PS – 1	UNIT 6	CAT 3516B	11	1,525	1,400	1,500	Unknown	1
PS – 2	UNIT 7	CAT CM32	11	3,456	2,880	600	2006	1
PS – 2	Trailer Unit	CAT PM3516B	11	1,525	1,400	1,500	Unknown	1

Note:

\* Status of generator unit: 1 = On-line, 0 = Off-line.

### A.2 Power Transformers

Power transformer data for Tongatapu Island in the Kingdom of Tonga of the Tonga Power Limited power system is listed below.

**Table 2. Power Transformer Data**

No.	From Bus	To Bus	KVA	Nominal Voltage		Status*
				Primary (kV)	Secondary (V)	
TR-1	PS - 2	PS – Auxiliary	500	11	415	1
TR-2	PS - 2	PS – Auxiliary	500	11	415	1

Note:

\* Status of transformer: 1 = On-line, 0 = Off-line.

### A.3 Distribution System Data

Distribution system data for Tongatapu Island in the Kingdom of Tonga of the Tonga Power Limited power system is listed below.

Distribution system equipment listed in this section includes data for distribution feeders, distribution transformers, and secondary wires.

**Table 3. Distribution Feeder Data**

Feeder	Substation	Bus No.	Total feeder Length (km)	Connected kVA
Feeder 1	Popua Power Station	PS – 1	46.248	9,210
Feeder 2	Popua Power Station	PS – 2	30.131	12,525
Vaini Feeder	Popua Power Station	PS – 2	71.278	4,440
<b>FEEDER TOTALS</b>			<b>147.657</b>	<b>26,175 *</b>

Note:

\* Transformers not included in the GIS mapping data were not included in the EasyPower model and are not reflected in this total system kVA.

**Table 4. Distribution Feeder-1 Conductor Data**

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
1 - 1	PS BUS - 2	1 - 1	300 mm <sup>2</sup>	Cu UG	225
1 - 2	1 - 1	1 - 2	Lynx	175 mm <sup>2</sup> Al OH	160
1 - 3	1 - 2	1 - 3	Lynx	Al OH	436
1 - 4	1 - 3	1 - 4	Fly	60 mm <sup>2</sup> Al OH	220
1 - 5	1 - 3	1 - 5	Lynx	Al OH	25
1 - 6	1 - 5	1 - 6	Lynx	Al OH	216
1 - 7	1 - 6	1 - 7	Lynx	Al OH	532
1 - 8	1 - 7	1 - 8	Lynx	Al OH	357
1 - 9	1 - 8	1 - 9	Lynx	Al OH	297
1 - 10	1 - 9	1 - 10	Gopher	25 mm <sup>2</sup> Al OH	178
1 - 11	1 - 10	1 - 11	Gopher	Al OH	77
1 - 12	1 - 11	1 - 12	Gopher	Al OH	50
1 - 13	1 - 12	1 - 13	Gopher	Al OH	230
1 - 14	1 - 13	1 - 14	Gopher	Al OH	134
1 - 15	1 - 12	1 - 15	Gopher	Al OH	358
1 - 16	1 - 10	1 - 16	Lynx	Al OH	88
1 - 17	1 - 16	1 - 17	Gopher	Al OH	237
1 - 18	1 - 16	1 - 18	Lynx	Al OH	610
1 - 19	1 - 18	1 - 19	Lynx	Al OH	70
1 - 20	1 - 19	1 - 20	Lynx	Al OH	225
1 - 21	1 - 20	1 - 21	Lynx	Al OH	592
1 - 22	1 - 21	1 - 22	Lynx	Al OH	117
1 - 23	1 - 19	1 - 23	Lynx	Al OH	410
1 - 24	1 - 23	1 - 24	Fly	Al OH	433
1 - 25	1 - 23	1 - 25	Lynx	Al OH	204
1 - 26	1 - 25	1 - 26	Lynx	Al OH	45
1 - 27	1 - 26	1 - 27	Cockroach	250 mm <sup>2</sup> Al OH	16
1 - 28	1 - 27	1 - 28	Fly	Al OH	76
1 - 29	1 - 28	1 - 29	Fly	Al OH	51
1 - 30	1 - 29	1 - 30	Fly	Al OH	48

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
1 - 31	1 - 30	1 - 31	35 mm <sup>2</sup>	Cu UG	23
1 - 32	1 - 31	1 - 32	Fly	Al OH	168
1 - 33	1 - 32	1 - 33	Fly	Al OH	51
1 - 34	1 - 33	1 - 34	Fly	Al OH	60
1 - 35	1 - 34	1 - 35	Fly	Al OH	182
1 - 36	1 - 35	1 - 36	Fly	Al OH	117
1 - 37	1 - 27	1 - 37	Lynx	Al OH	746
1 - 38	1 - 37	1 - 38	Lynx	Al OH	225
1 - 39	1 - 38	1 - 39	Lynx	Al OH	249
1 - 40	1 - 39	1 - 40	Gopher	Al OH	317
1 - 41	1 - 39	1 - 41	Lynx	Al OH	340
1 - 42	1 - 41	1 - 42	35 mm <sup>2</sup>	Cu UG	150
1 - 43	1 - 41	1 - 43	Lynx	Al OH	140
1 - 44	1 - 43	1 - 44	Fly	Al OH	234
1 - 45	1 - 43	1 - 45	Lynx	Al OH	390
1 - 46	1 - 45	1 - 46	Lynx	Al OH	389
1 - 47	1 - 46	1 - 47	Lynx	Al OH	723
1 - 48	1 - 47	1 - 48	Lynx	Al OH	71
1 - 49	1 - 48	1 - 49	Fly	Al OH	494
1 - 50	1 - 49	1 - 50	Fly	Al OH	870
1 - 51	1 - 50	1 - 51	Gopher	Al OH	238
1 - 52	1 - 51	1 - 52	Gopher	Al OH	48
1 - 53	1 - 52	1 - 53	Gopher	Al OH	242
1 - 54	1 - 52	1 - 54	Gopher	Al OH	480
1 - 55	1 - 54	1 - 55	Gopher	Al OH	344
1 - 56	1 - 48	1 - 56	Fly	Al OH	548
1 - 57	1 - 56	1 - 57	25 mm <sup>2</sup>	Al UG	1810
1 - 58	1 - 56	1 - 58	Fly	Al OH	95
1 - 59	1 - 58	1 - 59	Fly	Al OH	204
1 - 60	1 - 59	1 - 60	Lynx	Al OH	49
1 - 61	1 - 60	1 - 61	Lynx	Al OH	755
1 - 62	1 - 61	1 - 62	Lynx	Al OH	93

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
1 - 63	1 - 62	1 - 63	Aphis	40 mm <sup>2</sup> Al OH	334
1 - 64	1 - 62	1 - 64	Lynx	Al OH	483
1 - 65	1 - 64	1 - 65	Aphis	Al OH	158
1 - 66	1 - 64	1 - 66	Lynx	Al OH	100
1 - 67	1 - 66	1 - 67	Lynx	Al OH	983
1 - 68	1 - 67	1 - 68	Lynx	Al OH	448
1 - 69	1 - 68	1 - 69	Lynx	Al OH	627
1 - 70	1 - 69	1 - 70	Lynx	Al OH	862
1 - 71	1 - 70	1 - 71	Fly	Al OH	560
1 - 72	1 - 70	1 - 72	Lynx	Al OH	124
1 - 73	1 - 72	1 - 73	Lynx	Al OH	152
1 - 74	1 - 73	1 - 74	Fly	Al OH	1439
1 - 75	1 - 73	1 - 75	Lynx	Al OH	223
1 - 76	1 - 75	1 - 76	Lynx	Al OH	1522
1 - 77	1 - 66	1 - 77	Lynx	Al OH	1039
1 - 78	1 - 77	1 - 78	Lynx	Al OH	502
1 - 79	1 - 78	1 - 79	Lynx	Al OH	424
1 - 80	1 - 79	1 - 80	Fly	Al OH	380
1 - 81	1 - 79	1 - 81	Lynx	Al OH	437
1 - 82	1 - 81	1 - 82	Lynx	Al OH	652
1 - 83	1 - 82	1 - 83	Lynx	Al OH	312
1 - 84	1 - 83	1 - 84	Lynx	Al OH	710
1 - 85	1 - 83	1 - 85	Fly	Al OH	840
1 - 86	1 - 85	1 - 86	Fly	Al OH	341
1 - 87	1 - 86	1 - 87	Fly	Al OH	442
1 - 88	1 - 27	1 - 88	Fly	Al OH	168
1 - 89	1 - 88	1 - 89	Lynx	Al OH	51
1 - 90	1 - 89	1 - 90	Fly	Al OH	60
1 - 91	1 - 90	1 - 91	Fly	Al OH	182
1 - 92	1 - 90	1 - 92	Fly	Al OH	117
1 - 93	1 - 92	1 - 93	Lynx	Al OH	746
1 - 94	1 - 92	1 - 94	Fly	Al OH	225

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
1 - 95	1 - 94	1 - 95	Fly	Al OH	249
1 - 96	1 - 95	1 - 96	Gopher	Al OH	317
1 - 97	1 - 96	1 - 97	Lynx	Al OH	340
1 - 98	1 - 97	1 - 98	Fly	Al OH	168
1 - 99	1 - 98	1 - 99	Fly	Al OH	51
1 - 100	1 - 98	1 - 100	Fly	Al OH	60
1 - 101	1 - 100	1 - 101	Fly	Al OH	182
1 - 102	1 - 100	1 - 102	Fly	Al OH	117
1 - 103	1 - 102	1 - 103	Lynx	Al OH	746
1 - 104	1 - 103	1 - 104	Lynx	Al OH	225
1 - 105	1 - 104	1 - 105	Lynx	Al OH	249
1 - 106	1 - 105	1 - 106	Gopher	Al OH	317
1 - 107	1 - 106	1 - 107	Lynx	Al OH	340
1 - 108	1 - 107	1 - 108	Fly	Al OH	168
1 - 109	1 - 108	1 - 109	Fly	Al OH	51
1 - 110	1 - 109	1 - 110	Fly	Al OH	60
1 - 111	1 - 110	1 - 111	Fly	Al OH	182
1 - 112	1 - 111	1 - 112	Fly	Al OH	117
1 - 113	1 - 111	1 - 113	Lynx	Al OH	746
1 - 114	1 - 113	1 - 114	Lynx	Al OH	225
1 - 115	1 - 114	1 - 115	Lynx	Al OH	249
1 - 116	1 - 115	1 - 116	Gopher	Al OH	317
1 - 117	1 - 116	1 - 117	Lynx	Al OH	340
1 - 118	1 - 116	1 - 118	Fly	Al OH	168
1 - 119	1 - 118	1 - 119	Fly	Al OH	51
1 - 120	1 - 119	1 - 120	Fly	Al OH	60
1 - 121	1 - 120	1 - 121	Fly	Al OH	182
1 - 122	1 - 121	1 - 122	Fly	Al OH	117
1 - 123	1 - 116	1 - 123	Lynx	Al OH	746
1 - 124	1 - 123	1 - 124	Lynx	Al OH	225
1 - 125	1 - 124	1 - 125	Lynx	Al OH	249
1 - 126	1 - 125	1 - 126	Gopher	Al OH	317

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
1 - 127	1 - 124	1 - 127	Lynx	Al OH	340
1 - 128	1 - 127	1 - 128	Fly	Al OH	117
1 - 129	1 - 127	1 - 129	Lynx	Al OH	746
1 - 130	1 - 129	1 - 130	Lynx	Al OH	225
1 - 131	1 - 130	1 - 131	Lynx	Al OH	249
1 - 132	1 - 131	1 - 132	Gopher	Al OH	317
1 - 133	1 - 131	1 - 133	Lynx	Al OH	340
1 - 134	1 - 133	1 - 134	Fly	Al OH	168
1 - 135	1 - 87	1 - 135	Fly	Al OH	51
1 - 136	1 - 135	1 - 136	Fly	Al OH	60
1 - 137	1 - 136	1 - 137	Fly	Al OH	182
1 - 138	1 - 137	1 - 138	Fly	Al OH	117
1 - 139	1 - 137	1 - 139	Lynx	Al OH	746
1 - 140	1 - 139	1 - 140	Lynx	Al OH	225
1 - 141	1 - 140	1 - 141	Lynx	Al OH	249
1 - 142	1 - 107	1 - 142	Fly	Al OH	117
1 - 143	1 - 141	1 - 142	Fly	Al OH	117
1 - 144	1 - 142	1 - 143	Lynx	Al OH	746

Note:

\* Distance was measured from the GIS mapping data.

**Table 5. Distribution Feeder-2 Conductor Data**

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
2 - 1	PS BUS - 2	2 - 1	300 mm <sup>2</sup>	Cu UG	1120
2 - 2	2 - 1	2 - 2	Lynx	175 mm <sup>2</sup> Al OH	58
2 - 3	2 - 2	2 - 3	Lynx	Al OH	108
2 - 4	2 - 3	2 - 4	35 mm <sup>2</sup>	Cu UG	350
2 - 5	2 - 3	2 - 5	Lynx	Al OH	247
2 - 6	2 - 5	2 - 6	Gopher	25 mm <sup>2</sup> Al OH	365
2 - 7	2 - 5	2 - 7	Lynx	Al OH	660
2 - 8	2 - 7	2 - 8	Gopher	Al OH	619
2 - 9	2 - 8	2 - 9	Fly	60 mm <sup>2</sup> Al OH	389
2 - 10	2 - 9	2 - 10	Fly	Al OH	494
2 - 11	2 - 8	2 - 11	Gopher	Al OH	125
2 - 12	2 - 11	2 - 12	Gopher	Al OH	220
2 - 13	2 - 11	2 - 13	Gopher	Al OH	663
2 - 14	2 - 7	2 - 14	Lynx	Al OH	160
2 - 15	2 - 14	2 - 15	Fly	Al OH	260
2 - 16	2 - 15	2 - 16	Fly	Al OH	382
2 - 17	2 - 15	2 - 17	Fly	Al OH	156
2 - 18	2 - 17	2 - 18	Fly	Al OH	160
2 - 19	2 - 18	2 - 19	Fly	Al OH	448
2 - 20	2 - 19	2 - 20	35 mm <sup>2</sup>	Cu UG	589
2 - 21	2 - 20	2 - 21	Fly	Al OH	514
2 - 22	2 - 20	2 - 22	35 mm <sup>2</sup>	Cu UG	194
2 - 23	2 - 22	2 - 23	Fly	Al OH	376
2 - 24	2 - 20	2 - 24	Fly	Al OH	1286
2 - 25	2 - 24	2 - 25	Fly	Al OH	300
2 - 26	2 - 14	2 - 26	Lynx	Al OH	223
2 - 27	2 - 26	2 - 27	Fly	Al OH	428
2 - 28	2 - 26	2 - 28	Lynx	Al OH	650
2 - 29	2 - 28	2 - 29	Fly	Al OH	262
2 - 30	2 - 28	2 - 30	Lynx	Al OH	386
2 - 31	2 - 30	2 - 31	Lynx	Al OH	87
2 - 32	2 - 31	2 - 32	Fly	Al OH	43



Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
2 - 33	2 - 32	2 - 33	25 mm <sup>2</sup>	Al UG	262
2 - 34	2 - 31	2 - 34	Lynx	Al OH	79
2 - 35	2 - 34	2 - 35	Lynx	Al OH	152
2 - 36	2 - 35	2 - 36	Fly	Al OH	203
2 - 37	2 - 35	2 - 37	Lynx	Al OH	230
2 - 38	2 - 37	2 - 38	Fly	Al OH	50
2 - 39	2 - 38	2 - 39	Fly	Al OH	70
2 - 40	2 - 37	2 - 40	Lynx	Al OH	336
1 - 22	2 - 40	1 - 22	Lynx	Al OH	35
2 - 42	2 - 40	2 - 42	Lynx	Al OH	272
2 - 43	2 - 42	2 - 43	Gopher	Al OH	168
2 - 44	2 - 43	2 - 44	Gopher	Al OH	148
2 - 45	2 - 44	2 - 45	Gopher	Al OH	58
2 - 46	2 - 43	2 - 46	Fly	Al OH	212
2 - 47	2 - 42	2 - 47	Gopher	Al OH	476
2 - 48	2 - 47	2 - 48	Fly	Al OH	278
2 - 49	2 - 47	2 - 49	Gopher	Al OH	180
2 - 50	2 - 49	2 - 50	Fly	Al OH	106
2 - 51	2 - 49	2 - 51	Fly	Al OH	244
2 - 52	2 - 51	2 - 52	Fly	Al OH	368
2 - 53	2 - 52	2 - 53	Fly	Al OH	150
2 - 54	2 - 53	2 - 54	Fly	Al OH	642
2 - 55	2 - 53	2 - 55	Fly	Al OH	605
2 - 56	2 - 55	2 - 56	Fly	Al OH	245
2 - 57	2 - 56	2 - 57	Fly	Al OH	686
2 - 58	2 - 57	2 - 58	Fly	Al OH	86
2 - 59	2 - 58	2 - 59	Fly	Al OH	460
2 - 60	2 - 58	2 - 60	Fly	Al OH	472
2 - 61	2 - 60	2 - 61	Fly	Al OH	138
2 - 62	2 - 60	2 - 62	Fly	Al OH	72
2 - 63	2 - 62	2 - 63	Fly	Al OH	476
2 - 64	2 - 42	2 - 64	Fly	Al OH	74
2 - 65	2 - 64	2 - 65	Fly	Al OH	360
2 - 66	2 - 65	2 - 66	Fly	Al OH	244

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
2 - 67	2 - 66	2 - 67	Fly	Al OH	243
2 - 68	2 - 67	2 - 68	Fly	Al OH	186
2 - 69	2 - 68	2 - 69	Fly	Al OH	287
2 - 70	2 - 68	2 - 70	Fly	Al OH	111
2 - 71	2 - 70	2 - 71	Gopher	Al OH	189
2 - 72	2 - 71	2 - 72	Fly	Al OH	35
2 - 73	2 - 71	2 - 73	Gopher	Al OH	66
2 - 74	2 - 73	2 - 74	Fly	Al OH	224
2 - 75	2 - 73	2 - 75	Gopher	Al OH	240
2 - 76	2 - 75	2 - 76	Gopher	Al OH	392
2 - 77	2 - 76	2 - 77	Gopher	Al OH	246
2 - 78	2 - 76	2 - 78	Gopher	Al OH	52
2 - 79	2 - 78	2 - 79	Gopher	Al OH	284
2 - 80	2 - 78	2 - 80	Gopher	Al OH	110
2 - 81	2 - 80	2 - 81	Gopher	Al OH	408
2 - 82	2 - 76	2 - 82	Gopher	Al OH	89
2 - 83	2 - 82	2 - 83	Gopher	Al OH	133
2 - 84	2 - 67	2 - 84	Fly	Al OH	237
2 - 85	2 - 84	2 - 85	Gopher	Al OH	127
2 - 86	2 - 85	2 - 86	Fly	Al OH	180
2 - 87	2 - 85	2 - 87	Gopher	Al OH	200
2 - 88	2 - 87	2 - 88	Gopher	Al OH	154
2 - 89	2 - 87	2 - 89	Gopher	Al OH	487
2 - 90	2 - 89	2 - 90	Gopher	Al OH	307
2 - 91	2 - 90	2 - 91	Gopher	Al OH	300
2 - 92	2 - 91	2 - 92	Fly	Al OH	192
2 - 93	2 - 91	2 - 93	Gopher	Al OH	223
2 - 94	2 - 93	2 - 94	Gopher	Al OH	88
2 - 95	2 - 94	2 - 95	Fly	Al OH	175
2 - 96	2 - 94	2 - 96	Gopher	Al OH	378
2 - 97	2 - 96	2 - 97	Fly	Al OH	191
2 - 98	2 - 97	2 - 98	Fly	Al OH	333
2 - 99	2 - 98	2 - 99	Fly	Al OH	369
2 - 100	2 - 98	2 - 100	Gopher	Al OH	316

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
2 - 101	2 - 96	2 - 101	Gopher	Al OH	118
2 - 102	2 - 101	2 - 102	Fly	Al OH	440
2 - 103	2 - 101	2 - 103	Gopher	Al OH	86
2 - 104	2 - 103	2 - 104	Gopher	Al OH	542
2 - 105	2 - 104	2 - 105	Gopher	Al OH	434

Note:

\* Distance was measured from the GIS mapping data.

**Table 6. Distribution Feeder-3 (Vaini Feeder) Conductor Data**

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
V - 1	PS - 2	V - 1	70 mm <sup>2</sup>	Cu Submarine	740
V - 2	V - 1	V - 2	Lynx	175 mm <sup>2</sup> Al OH	466
V - 3	V - 2	V - 3	Lynx	Al OH	210
V - 4	V - 3	V - 4	Lynx	Al OH	426
V - 5	V - 4	V - 5	Lynx	Al OH	665
V - 6	V - 2	V - 6	Lynx	Al OH	1708
V - 7	V - 6	V - 7	Fly	60 mm <sup>2</sup> Al OH	2365
V - 8	V - 7	V - 8	Fly	Al OH	1402
V - 9	V - 6	V - 9	Lynx	Al OH	1552
V - 10	V - 9	V - 10	Lynx	Al OH	308
V - 11	V - 10	V - 11	Lynx	Al OH	138
V - 12	V - 11	V - 12	Lynx	Al OH	1142
V - 13	V - 12	V - 13	Lynx	Al OH	496
V - 14	V - 13	V - 14	Lynx	Al OH	290
V - 15	V - 14	V - 15	Gopher	25 mm <sup>2</sup> Al OH	265
V - 16	V - 15	V - 16	Fly	Al OH	972
V - 17	V - 16	V - 17	Fly	Al OH	358
V - 18	V - 16	V - 18	Fly	Al OH	786
V - 19	V - 18	V - 19	Fly	Al OH	610
V - 20	V - 15	V - 20	Gopher	Al OH	1630
V - 21	V - 20	V - 21	Gopher	Al OH	856
V - 22	V - 21	V - 22	Gopher	Al OH	638
V - 23	V - 22	V - 23	Gopher	Al OH	1400
V - 24	V - 23	V - 24	Gopher	Al OH	965
V - 25	V - 24	V - 25	Gopher	Al OH	54
V - 26	V - 25	V - 26	Gopher	Al OH	368
V - 27	V - 26	V - 27	Gopher	Al OH	288
V - 28	V - 27	V - 28	Gopher	Al OH	554
V - 29	V - 28	V - 29	Aphis	40 mm <sup>2</sup> Al OH	378
V - 30	V - 29	V - 30	Aphis	Al OH	659
V - 31	V - 30	V - 31	Aphis	Al OH	386
V - 32	V - 31	V - 32	Fly	Al OH	312

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
V - 33	V - 31	V - 33	Aphis	Al OH	280
V - 34	V - 33	V - 34	Aphis	Al OH	1136
V - 35	V - 34	V - 35	Aphis	Al OH	612
V - 36	V - 35	V - 36	Aphis	Al OH	1870
V - 37	V - 36	V - 37	Aphis	Al OH	1508
V - 38	V - 37	V - 38	Aphis	Al OH	2714
V - 39	V - 38	V - 39	Aphis	Al OH	1002
V - 40	V - 14	V - 40	Fly	Al OH	597
V - 41	V - 40	V - 41	Fly	Al OH	883
V - 42	V - 41	V - 42	Fly	Al OH	424
V - 43	V - 42	V - 43	Fly	Al OH	115
V - 44	V - 43	V - 44	Fly	Al OH	1487
V - 45	V - 44	V - 45	Fly	Al OH	368
V - 46	V - 45	V - 46	Fly	Al OH	706
V - 47	V - 46	V - 47	Fly	Al OH	342
V - 48	V - 46	V - 48	Fly	Al OH	689
V - 49	V - 46	V - 49	Fly	Al OH	285
V - 50	V - 49	V - 50	Fly	Al OH	510
V - 51	V - 50	V - 51	Aphis	Al OH	656
V - 52	V - 51	V - 52	Aphis	Al OH	534
V - 53	V - 50	V - 53	Aphis	Al OH	395
V - 54	V - 53	V - 54	Fly	Al OH	310
V - 55	V - 54	V - 55	Fly	Al OH	397
V - 56	V - 53	V - 56	Aphis	Al OH	534
V - 57	V - 56	V - 57	Aphis	Al OH	834
V - 58	V - 57	V - 58	Aphis	Al OH	244
V - 59	V - 58	V - 59	Aphis	Al OH	2272
V - 60	V - 59	V - 60	Aphis	Al OH	288
V - 61	V - 60	V - 61	Gopher	Al OH	1110
V - 62	V - 60	V - 62	Aphis	Al OH	409
V - 63	V - 62	V - 63	Fly	Al OH	363
V - 64	V - 62	V - 64	Aphis	Al OH	203
V - 65	V - 64	V - 65	Aphis	Al OH	1474
V - 66	V - 65	V - 66	Aphis	Al OH	794

Feeder - Section	From Bus	To Bus	Conductor		Distance (meters)*
			Type	Specifications	
V - 67	V - 66	V - 67	Aphis	Al OH	773
V - 68	V - 67	V - 68	Aphis	Al OH	1498
V - 69	V - 68	V - 69	Aphis	Al OH	1835
V - 70	V - 69	V - 70	Aphis	Al OH	652
V - 71	V - 70	V - 71	Aphis	Al OH	168
V - 72	V - 71	V - 72	Aphis	Al OH	938
V - 73	V - 72	V - 73	Aphis	Al OH	1414
V - 74	V - 11	V - 74	Lynx	Al OH	572
V - 75	V - 74	V - 75	Lynx	Al OH	845
V - 76	V - 75	V - 76	Lynx	Al OH	2342
V - 77	V - 76	V - 77	Lynx	Al OH	683
V - 78	V - 75	V - 78	Lynx	Al OH	595
V - 79	V - 78	V - 79	Lynx	Al OH	1293
V - 80	V - 79	V - 80	Lynx	Al OH	588
V - 81	V - 79	V - 81	Lynx	Al OH	1046
V - 82	V - 81	V - 82	Lynx	Al OH	597
V - 83	V - 82	V - 83	Lynx	Al OH	350
V - 84	V - 83	V - 84	Lynx	Al OH	1410
V - 85	V - 81	V - 85	Lynx	Al OH	172
V - 86	V - 85	V - 86	Lynx	Al OH	458
V - 87	V - 86	V - 87	Lynx	Al OH	462
V - 88	V - 87	V - 88	Lynx	Al OH	557
V - 89	V - 88	V - 89	Gopher	Al OH	308
V - 90	V - 88	V - 90	Lynx	Al OH	186
V - 91	V - 90	V - 91	Lynx	Al OH	235
V - 92	V - 91	V - 92	Lynx	Al OH	131
V - 93	V - 92	V - 93	Gopher	Al OH	409
V - 94	V - 92	V - 94	Lynx	Al OH	269
V - 95	V - 94	V - 95	Lynx	Al OH	346
V - 96	V - 95	V - 96	Lynx	Al OH	414

Note:

\* Distance was measured from the GIS mapping data.

**Table 7. Shunt Capacitor Data**

No.	Bus Name	Bus No.	Voltage (kV)	kVAR	Status*
CAP-1	BUS V-14		11	150	1
CAP-2	BUS V-78		11	150	1
CAP-3	BUS 2-43		11	150	1
CAP-4	BUS 1-41		11	150	1
CAP-5	BUS 1-108		11	150	1
<b>TONGATAPU TOTAL</b>				<b>750</b>	

Note:

\* Status of shunt capacitor: 1 = On-line, 0 = Off-line.

**Table 8. Single-phase Distribution Transformer Data\***

Tr. No.	Location	kVA	Bus No.
T0021	Ikamanu (Veitongo)	10	V-82
T0045	Lemisio Saale	25	1-78
T0065	TALAFOOU Digicel Tower	15	V-63
T0096	Lotolu GPS (Pelehake)	15	V-20
T0185	Dr S. Tapa (Kolonga)	30	V-68
T0223	Holonga Street Light	15	V-41
T0226	Makaunga Street Light	15	V-59
T0254	Mahe'uli'uli Tupouniua (Fatai) Hihifo Rd	30	1-105
T0255	Fo'ui Street Light	30	1-115
T0256	Paula Bloomfield (Lakepa)	30	1-143
T0257	Good Samaritan Inn (Kolovai)	30	1-129
T0277	Nukunuku 3 (Afe he Falema) Loss	15	1-109
T0281	Vaini 4 LDS loss (Afe Miamonga)	15	V-74
T0282	Vaini 5 (afe 'i a Miki)	15	V-74
T0283	Holonga 2 ('Afe 'api Lautohi) Loss	25	V-42
T0284	Lapaha 3 (Takuilau loss)	25	V-52
T0286	Lapaha 5 (Alele 2 Loss)	25	V-55
T0287	Tatakamotonga 3 (Afe 'api Polisi)	30	V-47
T0288	Kapeta 2 (Hon Veikune)	25	2-86
T0290	Maui 2 loss (Peseti Ma'afu)	25	1-93
T0291	Ha'ateiho 2 Loss (Fuka Kitekei'aho)	30	V-91
T0292	Keleti Beach (Veitongo)	25	V-84
T0293	Havelu Tokelau 3 (Kaimana Ave)	15	2-95
T0319	Pea 1 Loss (Afu)	15	V-95
T0321	Lakepa 2 Loss (Free Church of Tonga)	15	1-142
T0322	Kolonga 3 (Mounga'olive College)	15	V-71
T0325	Houma 4 loss (Sunset )	15	1-136
T0340	Havelu Tokelau 2 (Vili Naupoto) Manakovi	30	2-92
T0353	Talasiu Transformer (Lapaha)	15	V-65
T0359	Telekava (Tufuenga Loss)	50	2-74
T0362	Pea 2 Loss (LDS)	15	V-94
T0408	Digicel Tower (Houma)	30	2-33



Tr. No.	Location	KVA	Bus No.
T0410	Baron Vaea (Makapaeo)	10	1-76
T0412	Tokomololo 2 Loss	15	1-63
T0413	Houma Water Pump 2 Loss	15	1-138
T0415	Houma (Police)	15	1-139
T0420	Pausa Hofoa (Hihifo Rd)	50	1-98
<b>Total KVA</b>		<b>820</b>	

\* All transformers are rated at 11 kV primary voltage to 415 V secondary voltage.

**Table 9. Three-phase Distribution Transformer Data\***

Tr. No.	Location	kVA	Bus No.
T0001	Tonga Defence Service (Kolofo'ou Vaha'akolo Rd)	300	2-51
T0002	New Wharf (Faua) Ma'ufanga, off salote Rd	100	2-29
T0004	Dateline Hotel (Salote Rd Reserve Bank)	300	2-33
T0005	Atenisi (Kolomotu'a)	100	2-75
T0006	Western Union (Lotokolo) Taufua'ahau Rd	300	2-50
T0007	Langafonua (Kolofo'ou) Taufua'ahau Rd	300	2-49
T0008	Tonfon Station (Fualu) NOC	500	1-57
T0009	Kiteau Topui (Salote Rd)	200	2-55
T0010	Sia'atoutai	100	1-103
T0011	Havelu 3 (FWC Aleamotu'a Rd) Sky Hy	100	1-40
T0012	Mataliku Sawmill (Tonga Timber - Tokomololo)	100	1-65
T0014	Tonfon Tower (Tatakamotonga)	25	V-48
T0015	Tevita.M.Fifita. (Shopping Centre)	300	1-33
T0016	'Alatini Fisheries (Mailetaha) Taufaaahau Rd	200	1-28
T0017	Esafe Vuki (Longolongo)	50	2-100
T0018	Popua Power Station	30	PS-2
T0019	Hoi	50	V-57
T0020	Discovery Co-operation (Fanga)	100	1-88
T0022	Catholic Theological School (Veitongo)	30	V-80
T0023	Tatakamotonga 4 (G.P.S)	30	V-49
T0024	Kings Palace (Fua'amotu)	50	V-32
T0025	Whitney Ready Mix (Pea)	50	1-60
T0026	Nautoka 2 (Finefeuiaki)	30	V-65
T0028	Tonga High School	100	2-66
T0029	Tonfon Tower Liukava	15	1-125
T0030	J.M Store (Teufaiva)	100	1-32
T0031	Pacific Delight Bakery (Ma'ufanga)	150	2-26
T0032	Halaloto - Tokomolo to Liahona Rd	30	1-69
T0034	Tailulu College	100	1-42
T0035	Vaiola Hospital #2 (Tofoa)Fielekepa Rd	500	1-44
T0036	Fua'amotu 4 GPS	50	V-30
T0037	Chinese Embassy	200	2-33
T0038	Liku'alofa Resort ('Ahau)	30	1-132
T0039	FIFA (Lotoha'apai)	100	V-83

Tr. No.	Location	kVA	Bus No.
T0040	Kolovai 1 (Health Centre)	50	1-127
T0041	'Utukehe Resort (Fo'ui)	15	1-119
T0043	Royal International Hotel	500	V-24
T0044	Kanokupolu	30	1-133
T0047	FOUI (Mamonga)	50	1-123
T0048	LDS Temple 1 (Liahona)	500	1-72
T0049	LDS Temple 2 (Liahona)	500	1-72
T0050	Vaiola Hospital #1 (Tofoa) Fielakepa Rd	300	1-44
T0051	FWC Office (Salote road)	300	2-39
T0052	TV Tonga	30	2-33
T0053	Fasi 1 (Cable and Wireless) Salote Rd	150	2-30
T0054	Nukuma'anua (Sopu) Tutomu Nakao	150	2-27
T0055	FASI Cable Wireless	150	2-30
T0056	Fangaloto (Kofe Finau)	50	2-10
T0057	Tongamai 3 Tonga Water Board (Mataki'eua)	50	1-54
T0058	Tuimatamoana Fish Market (Ma'ufanga), off Salote Rd	500	2-27
T0059	Q.S. Wharf	500	2-16
T0060	Shell (Touliki)	200	2-18
T0061	PILI Digicel Tower	15	1-14
T0062	NZ High Commission Res. (Popua)	100	2-20
T0063	VAINI Digicel Tower	15	V-77
T0064	A3Z Transmitter (Popua)	75	2-23
T0066	TOLOA Digicel Tower	25	V-17
T0067	Haveluliku	50	V-39
T0068	Mataika 1 (Pili Rd)	75	1-11
T0069	Halaleva Gospel 1 (Ve'e Falelotu)	50	1-9
T0070	Siaosi Moala (Pahu By-Pass Rd)	100	1-18
T0071	'Anana 2 (JR)	100	1-4
T0072	Pili Quarry 2 (Nishi Trading)	100	1-14
T0073	TCC Tower (Houma)	30	1-140
T0075	Cecil Cocker (Kolomotu'a)	200	2-33
T0076	Magistrate Police (Kolofo'ou) Old Justice	500	2-48
T0077	SIC No. 1 (Royal Beer)	500	2-4
T0078	SIC No. 2 (Hawthorne Mach)	200	2-4
T0079	Marine Training School (Fokololo)	100	1-2
T0080	Ha'amoko Bakery (Ma'ufanga)	150	2-6

Tr. No.	Location	kVA	Bus No.
T0081	Houmakelikao 1 (By - Pass Rd)	100	2-7
T0082	Umusi (Blue Pasific)	50	2-13
T0083	Nukuhetulu	30	V-5
T0084	Viliami Sika (Vaini) Taufaaahau Rd	50	V-76
T0085	Longoteme	50	V-6
T0086	ANZ (Ma'ufanga)	100	2-26
T0087	Loumaile Logde (Kolofo'ou)	300	2-46
T0088	Piula	15	V-12
T0089	Ha'akame	30	1-86
T0090	Minolu Nishi ('Utulau)	100	1-84
T0091	Holonga 1 (Taniela Lasalo)	50	V-43
T0092	'Alaki (Fa'itoka)	30	V-44
T0093	Tatakamotonga 1 ('Api Polisi)	100	V-46
T0094	CCECC (Vaololoa MOW)	300	2-33
T0095	Tongamai 4 Tonga Water Board (Mataki'eua)	50	NOT IN GIS
T0097	CCECC (OTTO Sanft)	100	2-50
T0098	Talafo'ou	50	V-64
T0099	Navutoka	50	V-66
T0100	Fung Shing (Fasi)	300	2-34
T0104	Afa	50	V-72
T0105	CCECC (Taumoepau)	200	2-47
T0106	Atele	75	V-87
T0107	LDS Ha'akame	50	1-86
T0108	David Hunt (Fonongahina)	50	2-33
T0109	Pelehake	50	V-21
T0110	Kolonga 2 (Katolika)	30	V-70
T0111	Longolongo (FWC)	100	NOT IN GIS
T0112	Airport Tower	200	V-28
T0113	Sepa Mafi (Fonongahina) near 'Utulau	50	1-80
T0114	Tofoa Sefulu 1	100	V-34
T0115	Nakolo 1	30	V-34
T0116	Tofoa Sefulu 2	100	NOT IN GIS
T0117	Heilala Lodge (Ha'atafu)	30	NOT IN GIS
T0118	Fatumu	50	V-38
T0119	Lavengatonga	30	V-37
T0120	Tu'atakilangi	100	NOT IN GIS

Tr. No.	Location	kVA	Bus No.
T0121	MAFF (Queen Salote Wharf)	300	NOT IN GIS
T0122	Island Quarry (CCECC) Malapo	150	NOT IN GIS
T0123	Feleti Sevele ('Utulau)	30	1-81
T0124	Taumoepeau Building	500	2-47
T0125	MAKEKE Farm	150	V-76
T0126	Otto Sanft New Bulding	500	NOT IN GIS
T0127	Tungi Arcade	500	NOT IN GIS
T0131	Ha'ateiho 1 (Taufaahau Rd)	150	V-90
T0134	Houma Water Pump 1	30	1-138
T0135	Tufumahina	30	1-58
T0136	Matafonua (Fatai 2)	30	1-107
T0140	Kahoua Quarry	50	1-71
T0141	Matangiake - Liahona Village	100	1-72
T0144	L.D.S. Sewage (Matangiake)	30	1-75
T0145	L.D.S High School (Liahona)	500	1-75
T0149	Utulau	50	1-82
T0155	Ha'alalo	50	1-85
T0157	PAO (Fatai)	30	1-106
T0159	Vaololoa (Printing) Vaha'akolo Rd	100	2-89
T0160	Anana (SIC BY-Pass Rd)	100	1-5
T0161	TPL - Tonga Power Ltd Main Office	200	2-65
T0164	Old Power House (Fasi)	100	2-64
T0165	Sopu (G P S) Vuna Rd	150	2-56
T0166	Sione Filipe (Toutai,Sopu)	100	2-63
T0168	Malapo 1 (FWC)	30	V-40
T0170	Niutoua	30	V-73
T0171	Lapaha 2 ( Takuilau College )	50	V-51
T0172	Isileli (Tanaki Helu)	50	2-59
T0173	Nukuleka	30	V-61
T0174	Lapaha 4 ('Alele)	30	V-54
T0175	Toloa (Tupou College)	50	V-19
T0176	Folaha 1 (Ve'e 'api Katolika)	50	V-38
T0177	Papiloa (Ma'ufanga) Vuna Rd	50	2-19
T0187	SIC No. 3 ('Alatini Fisheries)	300	2-4
T0188	Australian High Commission office, Salote Rd	250	2-38
T0189	Polisi Kuli (Paula Hemaloto) Tofoa	30	2-99

Tr. No.	Location	kVA	Bus No.
T0190	Airport New Terminal	200	V-25
T0191	Somi Industries (Fatafehi Rd)	200	1-24
T0194	Ma'ufanga ('Ahopanilolo C Salote Rd)	200	2-26
T0195	Tofoa 1 (Vaha'akolo Rd)	100	2-104
T0196	Bank of Tonga ('Unga Rd)	200	2-44
T0198	Halaleva 1 (By-Pass Rd)	50	1-7
T0199	Malapo 2 (LDS)	50	V-15
T0200	Siaosi Lopeti (Fasi Tupoulahi Rd)	200	1-21
T0201	TCF (Ma'ufanga) By-Pass Rd	100	2-2
T0209	Holoipepe	10	1-112
T0210	Vakasiuola (Mala'evakapuna)	10	V-29
T0215	Toniu (Kauvai)	10	V-7
T0230	Vaini 1 (afe ki Longoteme)	100	V-10
T0231	Ngele'ia (GPS, Ngele'ia Rd)	150	1-12
T0232	Ha'asini & Hamula	50	V-36
T0234	Ma'afu Export (Ma'ufanga By-Pass Rd)	200	2-5
T0236	Lapaha 1 ('Api Siasi Katolika)	100	V-50
T0238	SIC No 4 (Tonga Gas)	200	2-2
T0239	Naval Base	300	2-17
T0245	Fua'amotu 1 (FWC Church)	100	V-31
T0246	Tokomololo 1 (M.A.F.)	50	1-64
T0247	Havelu T.C.B 4 (Apimataka)	100	2-97
T0248	L.D.S. Farm (Liahona)	30	1-74
T0249	Lesieli Vete (Puke) Hihifo Rd	50	1-102
T0250	Niumate (Liahona)	10	1-143
T0251	Tofoa 2 (Heilala Guest House Vaha'akolo Rd)	30	2-105
T0252	Police Training (Longolongo)	300	1-89
T0253	Te'ekiu	30	1-113
T0258	Uliti Uata (Mailetaha By-Pass Rd)	300	1-25
T0259	LAVAKA ATA (Liukava) Kolovai	50	1-126
T0261	Kapeta 1 (Old Vaiola Vaha'akolo Rd)	150	2-84
T0262	Kinikinilau Shopping Center (Ma'ufanga), off Salote Rd	200	2-28
T0264	Hofoa	50	1-99
T0265	Poutaha 1 (Pausa E M Jones)	100	1-47
T0266	Tonga National Centre (Tofoa)	50	1-45
T0269	Kolonga 1 (Health Center)	50	V-69

Tr. No.	Location	kVA	Bus No.
T0270	Asco Motor (Mailletaha )	50	1-29
T0271	Havelu 2 (Moi Tapealava) Taufa'ahau Rd	50	1-38
T0272	Houma 1 (Mangafa)	50	1-137
T0273	Lopaukamea (Taufa'ahau Rd)	100	1-34
T0274	Havelu 1 (LDS) Taufa'ahau Rd	100	1-37
T0275	Reserve Bank (Salote Rd)	500	2-40
T0276	Queen Salote Memorial Hall (Taufa'ahau Rd)	200	1-35
T0278	Ramanlal Western (Fo'ui)	50	1-117
T0280	Kauvai	15	V-8
T0285	Ha'amea Lavaka Ata (Siatoutai)	25	1-104
T0294	Houmakelikao 2 (Afe he Mala'e Soka) loss	15	2-12
T0295	Vaini 2 Loss (afe ki Longoteme)	30	V-9
T0299	PILI (Pili Rd)	50	1-14
T0300	T.C.C. Lotoha'apai (Taufa'ahau Rd)	30	V-85
T0301	Havelu Tokelau 1 (Vaha'akolo Rd)	30	2-93
T0302	Longolongo (Paula Maama)	50	2-76
T0303	Maui 4 (Falema)	30	1-95
T0304	Tongamai 1 Tonga Water Board (Mataki'eua)	30	1-51
T0305	Tatakamotonga 2 (Fale Ngaahi Va'e)	30	V-45
T0306	Ha'ateiho Water Pump	30	V-93
T0308	Tango Nano (Limu) Sopu, afe ki Hofoa	100	2-61
T0309	Monfort Technical College (Popua)	100	2-21
T0310	Tongamai 2 Tonga Water Board (Mataki'eua)	30	1-53
T0311	Lafalafa	30	V-23
T0312	Maui 1 (Hihifo Rd)	50	2-82
T0313	'Ahau	30	1-130
T0314	Matahau	30	1-112
T0315	Kupolu - Alani Pahulu	30	1-97
T0316	Fua'amotu 2 (Alu ki Nakolo)	30	V-33
T0320	Poutaha 2 (Afe ki Mataki'eua)	30	1-49
T0323	Kolovai 2 Loss	30	1-128
T0324	Kolomotu'a (Siu'ilikutapu Rd)	25	2-69
T0326	Samaletani 2	15	1-129
T0336	Nukunuku 2 (Hahake)	50	1-110
T0337	Hala'ovave 3 (Afe Mala'e 'Akapulu)	30	2-81
T0351	Maui 3 Loss (Hihifo Rd ) Sione Filipe	15	1-96

Tr. No.	Location	kVA	Bus No.
T0357	Mataika 2 Loss	15	1-17
T0364	Halaleva Gospel 2 Loss	30	1-8
T0369	Folaha 2 (Ofi kihe 'api Mamonga)	50	V-44
T0372	Hala'ovave 2 (Afe Falelotu Uesiliana)	30	2-79
T0375	Taliai Camp (Fua'amotu)	200	V-26
T0376	Veitongo (Taufaahau Rd)	50	V-81
T0377	S. 'Anitema (Nualei)	50	V-78
T0378	U.S.P. 'Atele	50	V-86
T0379	Masao Soakai (Utulau)	15	1-78
T0380	Vaini 3 LDS (Taufa'ahau Rd)	50	V-74
T0382	Veitongo (Loni Vea) Taufaaahau Rd	50	V-79
T0383	Manuka	50	V-67
T0384	Australian Force Res. (Fanga, Vaha'akolo)	100	2-90
T0386	Nukunuku 1 (Lotokolo)	100	1-111
T0387	Ha'ateiho (Taiana Latu)	30	V-89
T0389	Kings Dairy (Pea)	30	1-61
T0392	Va'epopua 1	50	2-24
T0395	Puke	30	1-101
T0396	Lavengamalie College (Tofoa)	50	1-46
T0397	Fatai 1	30	1-108
T0398	Lakepa 1 (Hala Lahi)	30	1-142
T0399	Houmakelikao 3 (Ve'e Faitoka)	50	2-9
T0401	Ha'atafu	30	1-134
T0402	Vailena Helu (Pelehake)	15	V-22
T0403	Masilamea	50	1-114
T0404	Hu'atolitoli	30	V-13
T0405	Hala'ovave 1 (Sunia'akaveka Rd)	50	2-80
T0406	Fisheries (Sopu)	50	2-62
T0407	Teufaiva Park	100	2-88
T0411	Fisi'ihoi Manu (Tokomololo)	15	1-77
T0414	Makeke (Farm)	10	V-76
T0416	Nakolo 2 (Tuki Kava)	15	V-35
T0417	Lomaiviti	30	1-68
T0418	Vaotu'u	30	1-141



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Tr. No.	Location	kVA	Bus No.
T0419	Fahefa	50	1-121
T0421	Kala'au	30	1-120
T0422	Airport (Tafa'aki Taliai Camp) Fua'amotu	200	V-27
T0423	Va'epopua 2	50	2-25
T0424	Tupouto'a (Villa, Mataki'eua)	100	1-55
T0426	Pea LDS	100	V-94
T0427	Pahu (Taife Vaka Tupoulahi Rd)	50	1-20
<b>Total KVA</b>		<b>27475</b>	

\* All transformers are rated at 11 kV primary voltage to 415 V secondary voltage.

### A.3.1 LV Secondary Wires

Distribution secondary service wires for Tongatapu Island are listed below.

**Table 10. LV Secondary Service Wire Data**

Name	Size (mm <sup>2</sup> )	Metal	Protection
Cockroach	250	Al	PVC
Fly	60	Al	PVC
LV ABC 95mm	95	Al	PVC
HV ABC 70mm	70	Al	PVC
7/16 Cu	16	Cu	PVC
Rango	70	Al	PVC
Dog	110	Al	PVC
Lynx	175	Al	PVC
10mm Cu	10	Cu	PVC
16mm Cu	16	Cu	PVC
25mm Cu	25	Cu	PVC
Hornet	150	Al	PVC
Squirrel	16	Al	PVC
Aphis	40	Al	PVC
Gopher	25	Al	PVC
LV ABC 35mm	35	Al	PVC
6mm Cu	6	Cu	PVC
35mm Cu	35	Cu	PVC
50mm Cu	55	Cu	PVC
3c 25mm Al UG	25	Al	HDPE PVC
3c 16mm Cu UG	16	Cu	HDPE PVC
3c 35mm Cu UG	35	Cu	HDPE PVE