



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

Data Handbook



Pacific Power Association.

Prepared for Yap State Public Service Corporation.

October 10, 2010 - Final



Copyright © 2010, Pacific Power Association.

The information contained in this document is the exclusive, confidential and proprietary property of the Pacific Power Association and is protected under the trade secret and copyright laws of Fiji and other international laws, treaties and conventions. N o part of this work may be disclosed to any third party or used, reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system, without first receiving the express written permission of Pacific Power Association. Except as otherwise noted, all trademarks appearing herein are proprietary to the Pacific Power Association .





Table of Contents

1.	Introc	luction	2			
2.	Data Content					
	2.1	Generator	2			
	2.2	Station Transformer	4			
	2.3	Distribution Feeder	5			
		2.3.1 Feeder	5			
		2.3.2 Distribution Transformer	6			
	2.4	Circuit Breaker and Sw itches	7			
	2.5	Reactor and Capacitor	8			
No	Appendix for this document					

List of Exhibits:

Table 1 – Generators	3
Table 2 – Station Transformers	. 4
Table 3 – Length of Feeders	. 5
Table 4 – Transformer count and kVA capacity sum	. 6
Table 5 – Connected kVA per Feeder	7
Table 6 – HV Circuit Breakers	. 7
Table 7 – Pad Mount Switches	. 7
Table 8 – Capacitor Data	. 8
Table 9 – Future Reactor Data	. 8

i





1. Introduction

KEMA Inc has been awarded by the Pacific Pow er 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)".

In this report, an Electrical Data Handbook contains all the electrical characteristics of the powe r system high voltage equipment in Yap State Public Service Corporation (YSPSC) is provided. All relevant data of the high and medium voltage asse ts, such as generation data, impedances of lines, cables, transformers, and other equipments if exists. KEMA has incorporated major data of components and equipment in power generation, transmission, distribution and metering. Data template is established to hold comprehensive equipment data, for example for transformers data collected power ratings, primary and secondary voltages, load and no load losses, tap changer data, BIL ratings, cooling class, applicable standards, weight, etc.

2. Data Content

All data contents are identified based on the information KEMA received.

2.1 Generator

There are 5 generators on the Yap main island.





Table 1 – Generators

VSDSC	Substation			Yap Main Island		
13530	Engine #	1	3	4	7	8
	ENGINE MAKE	Alco	White Superior	White Superior	Deutz MWM	Deutz MWM
Ś	ENGINE MODEL	251F	40V-SX-12	40V-SX-12	BV8M640	BV8M640
TAIL	ENGINE SERIAL NUMBER	M.39.38	20897	20300	10006	10005
R DE	NAME PLATE RATING (KW)	2,000	750	750	3,200	3,200
RATO	DE-RATED (KW)	700	550	550	0	0
ENEI	SPEED (RPM)	900	600	600	600	600
0	FUEL TYPE	#2 diesel	#2 diesel	#2 diesel	#2 diesel	#2 diesel
	YEAR INSTALLED	1985	1978	1978	1996	1996
AILS	MAKE	CANRON	Ideal Electric	Ideal Electric	AVK	AVK
DET	ТҮРЕ	Brush	Brush	Brush	Brushless	Brushless
VTOR	MODEL NO.	SG-1556	SA	SA	DIDBN 156 M/12	DIDBN 156 M/12
ERN	SERIAL NO.	360-328-303	289556	281009	8219880 A002	8219880 A001
ALTI	VOLTAGE (V)	4,160	4,160	4,160	4,200	4,200
REMARKS		Electrical & Mechanical problems - low fuel efficiency	Operational - needs major overhaul - low fuel efficiency	Operational - needs major overhaul - low fuel efficiency	Just completing its 48,000 hr service – oversized	Just completing its 48,000 hr service - oversized





2.2 Station Transformer

Two substation step-up transformers are operated in Yap main island to transfer power from 4.16kv generator bus to 13.8kv substation bus. No Load and Full Load losses and Z1, Z0 impedances are as specified in *Utility Engine Data Template - YSPSC.xls*.

	Substation Name		Yap Main Island		
VEDEC	Transform	ner Make	Westinghouse	ABB	
13730	Seria	I NO.	SET8039-0101	SE19277-001	
	Year of Manufacture		Sep-89	Nov-05	
	Rating (MVA)		5.6	5.6	
S	NO. of I	Phases	3	3	
ISTI	Vector	Group	YND1	YND1	
TER	Voltage (V)	High	13800Y/7970	13800Y/7970	
RAC	voltage (v)	Low	4160	4160	
HAF	Impedance (%)	Z1	5.44	5.38	
AL C	impedance (%)	ZO			
RIC	Losses (Watts)	No Load		7067	
ЕСТ		Full Load		27868	
Ш	Max. Current (A)	HV	209.2	234.3	
		LV	693.9	777.2	
TANK	Oil	Vol (Gals)	463	939	
CORE &	01	Weight (Lbs)	3472	7042	
OIL DETAILS	WEIGHT (I BS)	Net	18442	26608	
		Core, Coil & TC	10023	11767	
TAPS &	NO. of Taps		5	5	
DETAILS	Tap Chan	Tap Changer Type		De-energized	
COOLING METHOD			Oil cooler type	Oil cooler type	
REMARKS			WESTINGHOUSE	ABB, Small Power T ransformers, South Boston, VA.	

Table 2 – Station Transformers





2.3 Distribution Feeder

2.3.1 Feeder

There are 4 main distribution feeders in YSPSC's system. Majority of the feeders are 13.8 kV overhead lines, with the exception of several short sections of underground cable. The GIS data file that contains information of feeders is provided by YSPSC. A summary of lengths of each feeder can be found in the table below.

NAME	D.B.	Airport	Colonia	Hospital
Measured length of primary OH line	10.936	16.526	7.56	38.707
Measured length of primary UG cable	n/a	0.04687	0.0695	0.0844
REMARKS				

Table 3 – Length of Feeders

Secondary wires are partially modeled in the GIS database. Majority of secondary conductors are AL, mostly TPLX cable, with some are open wire. There are also a small amount of secondary wires are Cu, more open wire then TPLX cable.





2.3.2 Distribution Transformer

Distribution transformers are counted from the GIS database provided by YSPSC. List of distribution transformers is provided in the tables below. Z%, R%, X%, No Load and Full Load Losses are typical values for transformer in the same class of voltage and k VA capacity¹. YSPSC shall update the data with specific values provided by the transformer manufacture r.

YSPSC	Losses (Watts)		Number of Transformer	Total kVA Installed
kVA	No Load	Full Load		
5	42	154	42	210
10	73	215	99	990
15	84	305	79	1185
20	101	371	3	60
25	118	437	76	1900
30	137.2	496.2	6	180
35	156.4	555.4	2	70
37.5	166	585	10	375
40	169.8	615	1	40
45	177.4	675	6	270
50	185	735	4	200
67.5	255	955.5	2	135
75	285	1050	15	1125
80	299	1100	1	80
100	355	1300	1	100
112.5	382.1	1460.4	2	225
150	488.0	1941.8	2	300
225	576.9	3089.4	6	1350
300	716	3920	2	600
500	1140	5640	5	2500
	Total		364	11,895

Table 4 – Transformer count and kVA capacity sum

¹ Reference: Electric Power Distribution System Engineering, Turan Gonen





Total connected distribution transformer kVA to each feeder is listed in the table below.

FeederID	Connected kVA
Airport	2520
Hospital	2590
Colonia	6130
DB	630

Table 5 – Connected kVA per Feeder

2.4 Circuit Breaker and Switches

There is no circuit breaker data or switch data identified for YSPSC system.

The table below is provided as a template for future data capture.

Location	Туре	Voltage Rating	Quantity
Total			

Table 7 – Pad Mount Switches

Location	Voltage Rating	Quantity
Total		





2.5 Reactor and Capacitor

There is no capacitor or reactor in YSPSC system.

The table below is provided as a template for future capacitor data.

Location	Voltage Rating	MVAR	Quantity
Total			

Table 8 – Capacitor Data

The table below is provided as a template for future reactor data.

Table 9 – Future Reactor Data

Location	Voltage Rating	IMPEDANCE	Quantity
Total			



No Appendix for this document.