MHI WORK ORDER *66844 / 33057*

ULTRA SYSTEMS.
ROANOKE VALLEY II PROJECT
49.3MW STEAM TURBINE GENERATOR

OPERATION & MAINTENANCE MANUAL

MITSUBISHI HEAVY INDUSTRIES, LTD.

YOKOHAMA DOCKYARD & MACHINERY WORKS

INCLUDING SHEETS WITH COVER

配布先	
客先	
商事	
労基	
本社	
タ技二	
MHIA	
阪支	
原技管	
原環購	
品ボ	
品タ	
原営管	
原内営	
環一営	
原輸営	
原火サ	
タ設	
火プ設	
原計設	
ボ設	
環一設	
環二設	
環計設	
環建	
建築設	
原建管	
原建運	
原建計	
原建タ・テ	
機工務	
機工機	
機一組	
機一技	
タ設技G	
タ設生G	
菱データ設	
控	
合計	

POWER SYSTEMS ENGINEERING DEPERTMENT TURBINE DESIGNING SEC.	AGREED												
CHIEF OF SEC.													
APPROVED	HISTORY	Rev.1 REVISED AS PER CUSTOMER'S COMMENTS AND DWG'S ADDED. MAY 30 '94 T.H Rev.2 REVISED TO INCORPORATE CUSTOMER'S COMMENTS JULY 4 '94 M.S T.H											
CHECKED	T. Nakamura												
DRAWN													
DATE OF ISSUE	APR. 28 '94	DWG. ORDER	66844	DRAWING No.	T6-011-150	REV.	2						

2. DESIGN PARTICULARS

2.1 Steam Turbine

TYPE OF TURBINE	SINGLE CYLINDER, SINGLE FLOW, IMPULSE, CONDENSING TURBINE	
OUTPUT (at generator terminal)	CAPACITY	49,600 KW
RATED SPEED	TURBINE	3600 RPM
	GENERATOR	3600 RPM
ROTATION (Facing Gov. End)		CW
STEAM CONDITIONS		
– MAIN INLET STEAM	1500 psia	950 °F
– EXHAUST STEAM	2.15 ig Hg abs	
MAX. THROTTLE FLOW Lb/hr		395,900
MAX. EXHAUST FLOW Lb/hr		288,587
NO. OF STAGES		15
CRITICAL SPEED	1st	1580 RPM
(T/G COMBINED)	2nd	1820 RPM
	3rd	2100 RPM
	4th	4220 RPM

2.2 Auxiliaries

(1) OIL PUMP & DRIVERS

LUBE & CONTROL OIL

SERVICE	MAINSTAND-BY	EMERGENCY
PUMP TYPE	Centrrifugal	Centrrifuga
CAPACITY (GPM)	200	172
PRESSURE (PSIG)	250	50
SPEED (RPM)	3550	3550
DRIVER TYPE	AC motor	DC motor
DRIVER RATING (HP)	100	10

(2) LUBE OIL COOLER

TYPE	SHELL & TUBE
COOLING SURFACE	406 FT^2
NO. OF PASSES SHELL/TUBE	1/2
COOLING WATER	Fresh water (industrical water)
- FLOW	400 GPM
- TEMPERATURE	86 °F

(3) FILTERS

	LUBE OIL	CONTROL OIL
TYPE	DUPLEX	DUPLEX
FILTRATION	25 MICRONS	25 MICRONS

(4) LUBE OIL RESERVOIR

ITEM NO.	–
CHARGE CAPACITY	1585 GAL

(5) LUBE OIL PURIFIER

ITEM NO.	–
CAPACITY	5 GPM

(6) VAPOR EXTRACTOR (RESERVOR)

ITEM NO.	
TYPE	SMOG-HOG
CAPACITY	420 CFM
DRIVER	AC MOTOR
DRIVER RATING	1/2 HP

(7) GLAND STEAM CONDENSER

ITEM NO.	
TYPE	SHELL & TUBE
COOLING SURFACE	211 FT^2
NO. OF PASSES SHELL/TUBE	1/7
COOLING WATER	CONDENSATE
-FLOW MIN/MAX	330/716 GPM
TEMPERTURE	128.5 °F

(8) GLAND CONDENSER FAN (GLAND STEAM CONDENSER)

TYPE	CENTRIFUGAL
CAPACITY	177 CFM
HEAD	21.7 in Aq
SPEED	3500 RPM
DRIVER TYPE	AC MOTOR
DRIVER RATING	5 HP

3. STEAM & OIL SYSTEMS

The steam and lube / control oil systems are shown in the attached P & I diagrams.

The setpoints for various controls, except for turbine governor, are tabulated below;

SET POINT LIST

VARIABLES	SETPOINTS
LUBE OIL PRESSURE (Note 1)	21 psig
CONTROL OIL PRESSURE (Note 1)	199 psig
GLAND SEAL STEAM PRESSURE	1.0~5.0psig
LUBE OIL TEMPERATURE (OIL COOLER OUTLET)	113 °F

Notes

1. The oil pressures shall be adjusted to the specified values at T/G shaft center level.