


**WESTERN MOUNTAIN GAS TURBINE POWER STATION
RUWAIS, LIBYA
OF
GENERAL ELECTRICITY COMPANY OF LIBYA
TECHNICAL SPECIFICATION
FOR
FIRE PROTECTION SYSTEM - FIRE WATER PUMPING SYSTEM**

SPECIFICATION NO.: - PE-TS-210-552-A002



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
PPEI BUILDING, NOIDA (U.P.)
INDIA**

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SECTION – A

INTENT OF SPECIFICATION



FIRE PROTECTION SYSTEM SCOPE OF ENQUIRY

DOCUMENT NO.: PE-TS-210-552-A002

VOLUME- IIB

SECTION-A

REV. 0

SHEET 1 OF 1

1.0 SCOPE

This specification covers the design, manufacturing, testing, proper packing, delivery, supervision of work for Fire water pumping system as mentioned in the different section of this specification for WESTERN MOUNTAIN GAS TURBINE POWER STATION RUWAIS, LIBYA.

2.0 GENERAL TECHNICAL INSTRUCTIONS

- 2.1 This volume covers requirements of design, engineering, manufacturing and delivery, supervision of erection and commissioning of the fire water pumping system. It is not the intent to specify completely all details of design and construction. However, all the equipment shall conform, in all respect, to high standard of engineering, design and workmanship and be capable of performing the required duties in a manner acceptable to the owner who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.
- 2.2 In case of any Technical deviation, the Bidder shall indicate the same clause by clause in the enclosed schedules. In the absence of duly filled schedules, it will be construed that the bid conforms strictly to the specification.
- 2.3 The bidder may offer optionally the standard design of equipment indicating the deviations from the specification. However, feedback reports must be furnished of equipment performance. The acceptance of optional equipment shall not be binding on Purchaser.
- 2.4 Test reports & certificate of conformance for the items shall be submitted for BHEL acceptance.
- 2.5 In case of conflict between any two clauses, stringent of the two conditions shall prevail.

VOLUME – II B

SECTION – B

PROJECT INFORMATION

WESTERN MOUNTAIN (4 X V 94.2), RUWAIS, LIBYA EXT. GAS POWER PROJECT

PROJECT INFORMATION DATA

1.	Owner	GENERAL ELECTRIC COMPANY OF LIBYA (GECOL)
2.	Main Contractor	ELECTRIC CONSTRUCTION CO. (ECCO), LIBYA (A JOINT VENTURE OF LIBYAN AND INDIAN GOVT.)
3.	Project	2X156.1 MW (ISO) RATING V94.2 GAS TURBINE POWER PROJECT, RUWAIS, LIBYA
4.	Owner's consultant	ARABIAN CONSULTING AND ENGINEERING SERVICES CO. (ACESCO)
5.	Location	ABOUT 5 KMS FROM NEAREST RUWAIS TOWN. ABOUT 258 KMS FROM TRIPOLI (CAPITAL AND PORT CITY OF LIBYA, ALSO KNOWN AS TARABULUS IN ARABIC).
6.	Site	ABOUT 25 KMS FROM NALUT- A HILL STATION FOR WHICH CUSTOMER HAS PROVIDED METEOROLOGICAL DATA. Map of Libya and RUWAIS locations attached below.

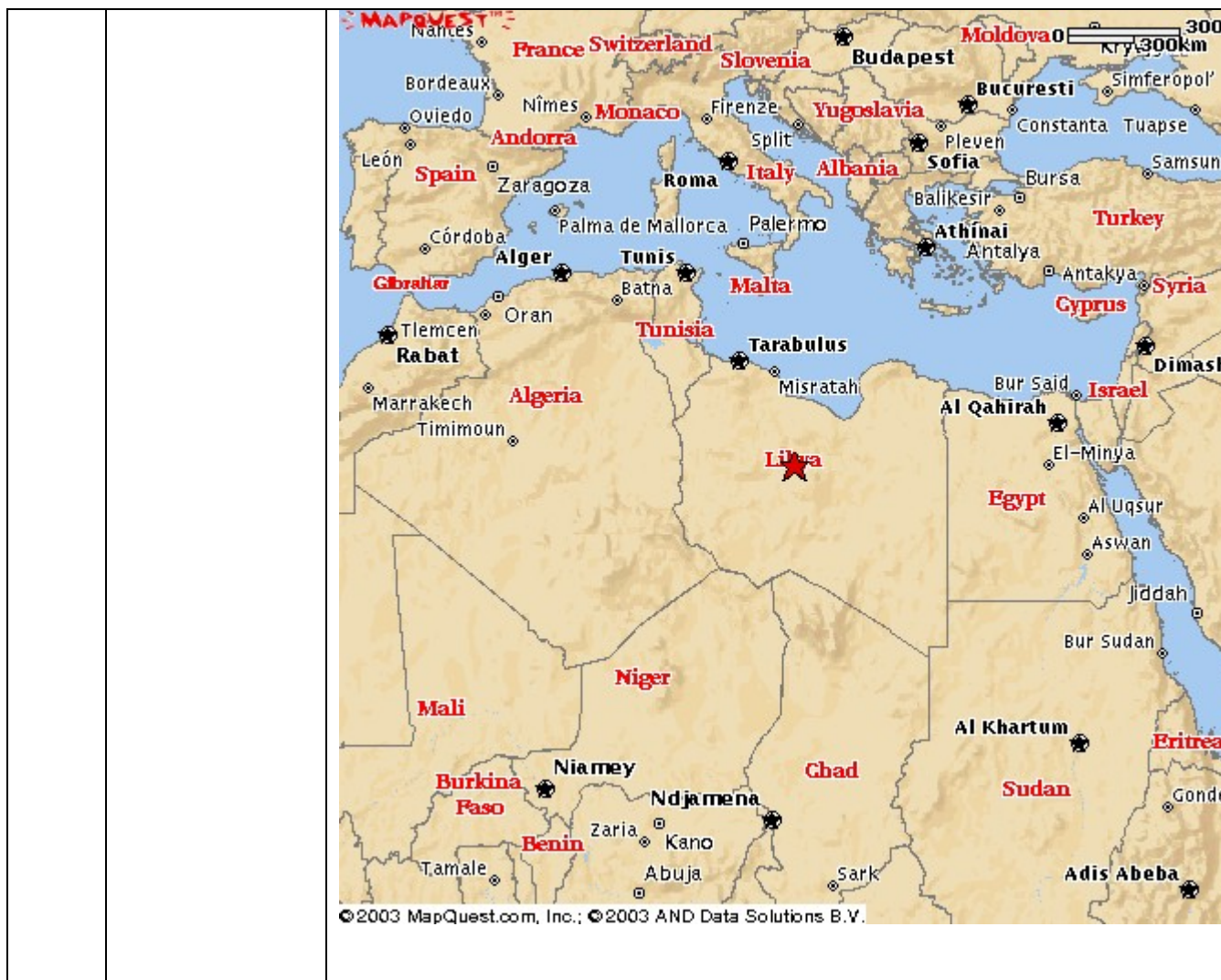
PREP : PB KARTHIK

CHKD : K.K.VOHRA

REVIEW : K.K.VOHRA

WESTERN MOUNTAIN (4 X V 94.2), RUWAIS, LIBYA EXT. GAS POWER PROJECT

PROJECT INFORMATION DATA



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CHKD : K.K.VOHRA

REVIEW : K.K.VOHRA

WESTERN MOUNTAIN (4 X V 94.2), RUWAIS, LIBYA EXT. GAS POWER PROJECT

PROJECT INFORMATION DATA

		<p>© 2003 MapQuest.com, Inc.; © 2003 AND Data Solutions B.V.</p>
7.	Nearest Airport	TRIPOLI (CAPITAL OF LIBYA)
8.	Nearest Port	TRIPOLI (CAPITAL OF LIBYA)
9.	Access to site	SITE IS ABOUT 258 KMS FROM TRIPOLI. TRANSPORT TIME FROM PORT TO SITE -ABOUT 4 TO 5 HOURS.
10.	Meteorological data	METEOROLOGICAL DATA FOR NALUT – A HILL STATION ABOUT 25 KMS FROM SITE HAS BEEN PROVIDED BY CUSTOMER AS ANNEXURE-I.

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WESTERN MOUNTAIN (4 X V 94.2), RUWAIS, LIBYA EXT. GAS POWER PROJECT

PROJECT INFORMATION DATA

S.NO.	DESCRIPTION	DATA
A	Altitude [Observatory]	621m. above mean sea level
B	Ambient Conditions:	
1.	Mean Maximum Ambient Air Temperature (IN HOTTEST MONTH)	48 Deg.C
2.	Mean Minimum Ambient Air Temperature (IN COLDEST MONTH)	1 Deg.C
	Dry Bulb Temperatures	
1.	Minimum [Annual Mean]	
2.	Maximum [Annual Mean]	40 Deg.C.
3.	Highest recorded :	50 Deg.C.
4.	Lowest recorded :	-5 Deg.C.
	Wet Bulb Temperatures	
1.	Annual Mean	
2.	Monthly Mean	
C	RELATIVE HUMIDITY	
1.	Maximum Humidity	60%
2.	Minimum Humidity	
3.	Annual Mean	
D	RAINFALL	
1.	Annual Mean	
2.	Maximum for 24 hours	
3.	Rainfall Intensity (Peak)	60 mm/hr
E	WIND DATA	
1.	Max Wind Speed	150Kmph
2.	Prevailing Wind Direction	
3.	Wind Pressure	
F	SEISMIC COEFFICIENT	Basic Earthquake Horizontal Coefficient : 0.04 g
G	Atmospheric Pressure [Annual Mean]	

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WESTERN MOUNTAIN (4 X V 94.2), RUWAIS, LIBYA EXT. GAS POWER PROJECT

PROJECT INFORMATION DATA

10.0	Power Supply The power supplies for distribution and auxiliaries shall be as under:	
	a) In plant generation	15.75kV \pm 5% , 3ph, 50Hz + 3% to -5%, high resistance earthed.
	b) MV distribution	6.6kV \pm 10 % , 3ph, 3w, 50 Hz, + 3 % to - 5%, low resistance earthed .
	c) LT distribution	380V \pm 10%, 3ph, 4W, 50Hz + 3% to -5%, solidly earthed system.
	d) Motor rated 200 KW and above	6.6kV \pm 10 % , 3 ph, 50Hz +3% to -5%.
	e) Motor rated 0.2 KW to below 200 KW	380V \pm 10%, 3 ph, 50Hz +3% to- 5%
	f) Motor rated below 0.2 KW	220V \pm 10%, 1 ph, 50Hz +3% to- 5%
	g) Panel space heating , lighting.	220V \pm 10%, 1ph, 50Hz + 3% to - 5%.
	h) DC Motors	220V DC + 10% to - 15%, 2 wire ungrounded system
	i) Control supply for relay panel/ 6.6kV breakers/380V breakers	220V DC + 10% to - 15%, 2 wire ungrounded system
	j) UPS for instrumentation & Control system (2X100% common UPS for all four units with Lead Acid Plante batteries for ONE (1.0) hour back-up).	220V AC \pm 2 % , 50Hz \pm 0. 5%
	k) Control supply for 380V Motor contactors/AC Control circuits [to be generated in MCC /panel by vendor]	110V AC \pm 10%, 50Hz + 3% to -5%
	l) 6.6 kV Black Start Supply Diesel Generator	6.6 kV \pm 10%, 3ph, 3W, 50Hz +3%to -5%, Ungrounded.
NOTE:	1. All equipment shall be suitable for 10% combined voltage and frequency variation. 2. Any other power supply requirement shall be derived by the vendor from the above available power supplies.	

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WESTERN MOUNTAIN (4 X V 94.2), RUWAIS, LIBYA EXT. GAS POWER PROJECT

PROJECT INFORMATION DATA

11.0	Design ambient:	
11.1	All electrical equipment and devices shall be designed for ambient temperature of 50 deg. C.	
12.0	Fault levels for Auxiliary Power Supplies	
	a) 6.6kV	31.5kA RMS for 1 Sec.
	b) 380V	45 kA RMS for 1 Sec.
	a) 220V DC	10 kA for 1 Sec.

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FIRE PROTECTION SYSTEM
SCOPE OF SUPPLY

WESTERN MOUNTAIN GAS TURBINE POWER STATION

DOCUMENT NO.: **PE-TS-210-552-A002**

VOLUME- IIB

SECTION-C

REV. 0

SHEET 1 OF 4

VOLUME-IIB
SECTION- 'C'
SCOPE OF SUPPLY



FIRE PROTECTION SYSTEM

SCOPE OF SUPPLY

WESTERN MOUNTAIN GAS TURBINE POWER STATION

DOCUMENT NO.: PE-TS-210-552-A002

VOLUME- IIB

SECTION-C

REV. 0

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GENERAL

This specification is intended to cover design, engineering, manufacture, inspection, testing at manufacturer's works, supply/delivery duly packed at port as specified elsewhere inclusive of all prevailing taxes, duties and other levies as required for the project. Bidder may please note that the parts with listed s.no. are not available with OEM due to obsolescence, upgradation of model etc., bidder may quote equivalent compatible parts.

1. MECHANICAL SCOPE

- **Pump Controller for Motor driven pump**

- ✓ Cutler Hammer, Canada (Model No.FDM30, S.No.16B9688E)
- ✓ Pl. refer the TDS for Controllers for Fire water Pumps : PE-TDS-552-210-A156 as attached in Section D.
- ✓ Quantity to be provided:
Pump controller for motor driven pump - 1 No.

- **Relay Card for Diesel Engine Pump#2 Controller**

- ✓ Cutler Hammer, Canada (Model No. FD100, Serial No.16B9689D)
- ✓ Pl. refer the TDS for Controllers for Fire water Pumps : PE-TDS-552-210-A156 as attached in Section D.
- ✓ Quantity to be provided:
Relay card for diesel engine pump#2 controller - 1 No.

- **Servicing of Diesel Engine Driven Pump #1 & #2**

- ✓ Clark Detroit Diesel, USA (Model No. DDFP08-FH, Serial No.1112338-1 & S.No.1112338-2)
- ✓ Pl. refer the TDS for Diesel engine for Fire water pumps : PE-TDS-552-210-A153 as attached in Section D.
- ✓ Quantity to be provided:

S.NO.	PART NAME	QTY. FOR DE #1	QTY. FOR DE #2
1	Filter, Lube oil	2	2
2	Filter, Fuel primary	2	2
3	Filter, Fuel secondary	2	2
4	Air cleaner element	2	2
5	Engine Oil *	22 Lit.	22 Lit.
6	Coolant **	63 Lit.	63 Lit.
7	Gear Oil	1 Lot	1 Lot

*Fill engine crankcase with SAE 40 weight oil meeting API service designation of CF-2. Bidder shall not use a multi-viscosity oil like 15W-40 in this series engines.

**Fill engine cooling system with premixed 50% water/50% coolant solution. Use only coolants meeting ASTM-D4985 specifications for heavy-duty diesel engines. Bidder shall not use light-duty or automotive coolants in the engine (ASTMD3306). Fill to bottom of fill neck.



FIRE PROTECTION SYSTEM

SCOPE OF SUPPLY

WESTERN MOUNTAIN GAS TURBINE POWER STATION

DOCUMENT NO.: PE-TS-210-552-A002

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- **Governor Solenoid for Diesel Engine#1 & 2:**
 - ✓ Clark Detroit Diesel, USA (Model No. DDFP08-FH, Serial No.1112338-1 & S.No.1112338-2)
 - ✓ Pl. refer the TDS for Diesel engine for Fire water pumps: PE-TDS-552-210-A153 as attached in Section D.
 - ✓ Quantity to be provided:
Governor Solenoid for Diesel Engine - 2 No.
- **Relay Card for Tachometer Panel of Diesel Engine #2**
 - ✓ Clark Detroit Diesel, USA (Model No. DDFP08-FH, Serial No.1112338-1 & S.No.1112338-2)
 - ✓ Pl. refer the TDS for Diesel engine for Fire water pumps : PE-TDS-552-210-A153 as attached in Section D.
 - ✓ Quantity to be provided:
Relay Card for Tachometer Panel of Diesel Engine - 1 No.
- **Pressure Switch for auto operation**
 - ✓ M/s NORGREN-HERION/Model No.880420/ Equivalent pressure switches to be provided.
 - ✓ Pl. refer the TDS for Pressure switch for Fire water pumps: PE-TDS-552-210-A043 as attached in Section D.
 - ✓ Refer P&ID of Fire water P/H (PE-DG-210-552-A001) for operating parameters.
 - ✓ Instrument to be provided along with all the mounting accessories.
 - ✓ Quantity to be provided:
Pressure switch - 5 NOS.
- **Level Switch for HP tank**
 - ✓ M/s Sigma Instruments / Equivalent pressure switches to be provided.
 - ✓ Pl. refer the TDS for Level switch for Fire water pumps: PE-TDS-552-210-A047 as attached in Section D.
 - ✓ Refer P&ID of Fire water P/H (PE-DG-210-552-A001) for operating parameters.
 - ✓ Instrument to be provided along with all the mounting accessories.
 - ✓ Quantity to be provided:
Level switch - 2 NOS.

2. PACKING

Mechanical items e.g. valves, fittings, pipes, wrapping and coating material shall be individually wrapped using polyethylene sheets/U foam/thermocole sheets/air bubbled sheets depending upon the item and then packed in wooden boxes suitable for sea transportation. The leftover spaces and top of the boxes shall be filled with rubberized coir to get proper cushioning effect. Silica gel shall be used for absorbing moisture (qty shall not be 4 gms per liter volume of case subject to min 400 gms per case). Marking shall be provided on the boxes indicating position of the boxes for handling, storage and nature of consignment along with dispatch details.

3. MAKES OF EQUIPMENTS / ITEMS

Bidder to note that makes shall be as specified above in S.No.1 above.



FIRE PROTECTION SYSTEM

SCOPE OF SUPPLY

WESTERN MOUNTAIN GAS TURBINE POWER STATION

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SECTION-C

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4. INSPECTION & TESTING

Bidder shall furnish the copy of UL/FM Certification and Certificate of Conformance (COC) for all the imported components listed above. Test reports shall be submitted for indigenous equipments.

NOTE: It is to be noted by bidders that originally fire protection system supplied by M/s Gunnebo India Ltd., Mumbai & commissioned by BHEL prior to year 2010. The fire water pumps are not presently in auto operation due to requirements of components/parts as listed above. It would be bidder's responsibility to commission the fire water pump package in auto during supervision work of erection & commissioning works.

ANNEXURE-I
MAKE LIST



FIRE PROTECTION SYSTEM PERFORMANCE REQUIREMENTS

DOCUMENT NO.: PE-TS-210-552-A002

VOLUME- III

SECTION-

REV. 0

SHEET 1 OF 1

MAKE LIST

S.No.	Description of the Item	Make /Part No./Serial No.	Remark (Address of Vendor)
1	Pump Controller for Motor driven pump	Cutler Hammer, Canada (Model No.FDM30, S.No.16B9688E)	Cutler Hammer, 403, East Lake, BLVD, Airdric, Alberta, T4A241, Canada Phone 403-948-7955 Fax 403-948-6967 web www.chfire.com
2	Relay Card for Diesel Engine Pump#2 Controller	Cutler Hammer,Canada (Model No. FD100, Serial No. 16B9689D)	Cutler Hammer, 403, East Lake, BLVD, Airdric, Alberta, T4A241, Canada Phone 403-948-7955 Fax 403-948-6967 web www.chfire.com
3	Servicing of Diesel Engine Driven Pump#1	Clark Detroit Diesel, USA (Model No. DDFP08-FH, Serial No.1112338-1)	Clarke Detroit Diesel, 13400 Outer Drive, West Detroit, Michigan 48239-4001, Phone-313-592- 5000 Telefax 4320091 TWX-810-221-1649 web www.detroitdiesel.com
4	Servicing of Diesel Engine Driven Pump#2	Clark Detroit Diesel, USA (Model No. DDFP08-FH, S.No.1112338-2)	Clarke Detroit Diesel, 13400 Outer Drive, West Detroit, Michigan 48239-4001, Phone-313-592- 5000 Telefax 4320091 TWX-810-221-1649 web www.detroitdiesel.com
5	Relay Card for Tachometer Panel of Diesel Engine #2	Clark Detroit Diesel, USA (Model No. DDFP08-FH, S.No.1112338-2)	Cutler Hammer, 403, East Lake, BLVD, Airdric, Alberta, T4A241, Canada Phone 403-948-7955 Fax 403-948-6967 web www.chfire.com
6	Governor Soenoid for Diesel engine# 1 & 2	Clark Detroit Diesel, USA (Model No. DDFP08-FH, S.No.1112338-1 & 2)	Cutler Hammer, 403, East Lake, BLVD, Airdric, Alberta, T4A241, Canada Phone 403-948-7955 Fax 403-948-6967 web www.chfire.com
7	Pressure Switches for auto operation	NORGREN-HERION/Model No.880420/Equivalent	
8	Level Switches for HP Tank	Sigma Instruments/Equivalent	



FIRE PROTECTION SYSTEM
SCOPE OF SUPPLY

WESTERN MOUNTAIN GAS TURBINE POWER STATION

DOCUMENT NO.: **PE-TS-210-552-A002**

VOLUME- IIB

SECTION-D

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VOLUME-IIB
SECTION- 'D'
TECHNICAL DATA SHEETS



FIRE PROTECTION SYSTEM

WRITEUP

WESTERN MOUNTAIN GAS TURBINE POWER STATION

DOCUMENT NO.: **PE-TS-210-552-A002**

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SECTION-D

REV. 0

SHEET 1 OF 1

Please note that materials listed in the specification are required to make good the supplies of fire protection system of **WESTERN MOUNTAIN GAS TURBINE POWER STATION**, presently under execution by BHEL on turnkey basis. The copy of following approved datasheets/ drawings/ documents are attached for compliance by all the bidders.

S.NO.	TECHNICAL DATA SHEETS / DRAWINGS
1	TECHNICAL DATA SHEET FOR DIESEL ENGINE FOR FIRE WATER PUMP : PE-TDS-552-210-A153
2	TECHNICAL DATA SHEET FOR CONTROLLERS FOR FIRE WATER PUMPS : PE-TDS-552-210-A156
3	TECHNICAL DATA SHEET FOR PRESSURE SWITCH : PE-TDS-552-210-A043
4	TECHNICAL DATA SHEET FOR LEVEL SWITCH : PE-TDS-552-210-A047
5	P&ID OF FIRE WATER PUMP HOUSE : PE-DG-210-552-A001

TECHNICAL DATA SHEET FOR DIESEL ENGINE FOR FIRE WATER PUMP

PROJECT-4 x 156.1 MW (ISO) RATING V 94.2 GAS TURBINE POWER PROJECT , RUAIS , LIBYA

BHEL Doc. No.: PE-TDS-552-210-A153

Sheet 1 of 3

SR.NO.	DESCRIPTION	DIESEL ENGINE FOR STANDBY ENGINE DRIVEN PUMP
A	<u>DRIVE DIESEL ENGINE DATA</u>	
1.00.00	General	: To drive Fire Pump
1.01.00	Type	: COMPRESSION (DIESEL)
1.02.00	Manufacturer	: CLARKE DETROIT DIESEL, USA
1.03.00	Model No.	: DDFP08-FH
2.00.00	Design and performance	
2.01.00	Design standard	: FM / UL
2.02.00	Number of cylinders, orientation of cylinders, bore and stroke (in mm.)	: 8, VEE, 123MM x 127MM
2.03.00	Rated RPM	: 1750
2.04.00	Brake horse power rating of engine at rated RPM	: 575HP
2.04.01	Net brake horse power available power at shaft at Rated RPM (KW) after deducting all auxiliary power consumption and also derating for site elevation & temperature	: 540HP
2.04.02	Derating factor values considered in 2.04.01 above (Approx.)	: 4.5% for temperature and 1.55% for altitude
2.04.03	Auxiliary power considered in 2.04.01 above	: Nil
2.04.04	Power absorbed by the pump at 150% of rated discharge (I.e power required to drive the pump when delivering 150% of rated discharge/capacity)	: 381.2 KW
2.05.00	Margin provided over the power required at duty point of the pump after considering the effect of site elevation and ambient temperature	: 79HP (17% MARGIN)
2.06.00	Percentage (%) overloading at the rated speed for one (1) hour running in any period of 12 hours consequent running	: Nil
2.07.00	Continuous hours of operation on full load of the engine, at the site elevation and design ambient temperature	: Engines can be used for continuous operation
2.08.00	Specific fuel consumption and tolerance at full load (575HP)	: 95 Litres/Hr
2.09.00	Exhaust temp. (Deg. F)	: 895 Deg.F
3.00.00	Oil lubrication system	: Forced oil lubrication
3.01.00	Whether Lube oil pump is crank driven ?	: NO, GEAR DRIVEN
3.02.00	Whether all valves, piping & fittings, filters etc. Provided ?	: Yes
3.03.00	Whether cooling arrangement for oil lubrication system provided ?	: Yes
3.04.00	Lub oil cooler	: ENGINE WATER COOLED, PLATE TYPE
3.04.01	Make	: DETROIT DIESEL
3.04.02	No. per engine	: One
4.00.00	Governing system	: MECHANICAL
4.01.00	Whether speed governing system provided as per specifications?	: Yes - Constant speed
4.02.00	Make	: DETROIT DIESEL
4.03.00	Steady state speed	: 1750RPM
5.00.00	High water temperature shut down switch provided as per specification	: Yes

TECHNICAL DATA SHEET FOR DIESEL ENGINE FOR FIRE WATER PUMP

PROJECT-4 x 156.1 MW (ISO) RATING V 94.2 GAS TURBINE POWER PROJECT , RUAIS , LIBYA

BHEL Doc. No.: PE-TDS-552-210-A153

Sheet 2 of 3

SR.NO.	DESCRIPTION	DIESEL ENGINE FOR STANDBY ENGINE DRIVEN PUMP
6.00.00	Self starting system	
6.01.00	Voltage	: 24 Volts
6.02.00	Starting motor make	: DETROIT DIESEL
6.03.00	Battery numbers per engine	: 2 sets (each set of 2 x 24 Volts)
6.04.00	Time required by the engine to accept full load after receipt of the signal to start from condition	: 5 seconds depending on engine maintenance
7.00.00	Alternative manual starting arrangement provided ?	: Provided
8.00.00	Battery charging system	
8.01.00	Make	: Cuttler - Hammer
8.02.00	Type	: Trickle and Boost charging
8.03.00	No. per engine	: Two
9.00.00	Both engine driven generator and rectifier type battery charger furnished	: Yes
10.00.00	Automatic controlling arrangement for rectifier type battery	: Yes
11.00.00	Fuel System	
12.00.00	Gravity tank details	
	a) No. (for each engine)	: One
	b) Whether integral with engine ?	: No
	c) Capacity	: 766 Gallons
	d) Material	: Carbon steel
	e) Time of continuous full load running with full capacity storage, hours	: As per NFPA 20
	f) Tanks as per specification furnished	: As per NFPA 20
12.01.00	Engine fuel pump supplied ?	: Yes
12.02.00	all piping, valves fittings, filters etc. supplied ?	: Yes
13.00.00	Cooling system	
13.01.00	Direct cooling system provided	: Heat exchanger provided
13.02.00	Necessary piping, fitting valves, pressure reducing orifice, pressure gauge etc.furnished	: Yes
13.03.00	cooling water M3/hr	: 9.54 M3/HR
13.04.00	Cooling water pressure (kg/sq.cm g)	: 62 kPa
13.05.00	Cooling water inlet temperature before cooling (Deg. C)	: Ambient
13.06.00	Cooling water outlet temperature after cooling (Deg. C)	: Approximately 10 Deg. C
13.07.00	Alternative engine mounted air cooled radiator for cooling system, if required by the bidder	: Not applicable
14.00.00	Level gauges for fuel oil tank and lubricating oil sump	: Level gauge provided for fuel oil tank and dip stick for lube oil sump
15.00.00	Exhaust system	
15.01.00	Type	: BLANKETS ON MANIFOLD
15.02.00	Silencer	
15.03.00	Type	: Critical grade
15.04.00	Max. noise alternation at distance of 1m	: 105 dBA

TECHNICAL DATA SHEET FOR DIESEL ENGINE FOR FIRE WATER PUMP

PROJECT-4 x 156.1 MW (ISO) RATING V 94.2 GAS TURBINE POWER PROJECT , RUAIS , LIBYA

BHEL Doc. No.: PE-TDS-552-210-A153

Sheet 3 of 3

SR.NO.	DESCRIPTION	DIESEL ENGINE FOR STANDBY ENGINE DRIVEN PUMP
15.05.00	Material of construction	: Carbon steel
15.06.00	Whether spark arrestor provided	: Yes
16.00.00	Turbo Charger	1.23 A/R
16.01.00	Make	: DETROIT DIESEL
16.02.00	Type	: Turbine type
16.03.00	No.per engine	: One
17.00.00	Engine Protection	
17.01.00	Type of engine protection provided	: As per NFPA 20
18.00.00	Whether emergency stop push button at the engine provided ?	: Yes
19.00.00	Flywheel with guard (i.e flywheel housing) provided ?	: Yes
20.00.00	Material of construction	: As per engine manufacturer's standard
21.00.00	Painting	: As per engine manufacturer's standard
22.00.00	Weight of the engine (dry)	: 2662
23.00.00	Whether diesel engine approved by UL/FM	: Yes
24.00.00	Documents forming part of this data sheet	
24.00.01	Manufacturer's Data catalogue	: Attached catalogue, section 013, page 322
24.00.02	Fuel specifications	: Attached two sheets

TECHNICAL DATA SHEET FOR CONTROLLERS FOR FIRE WATER PUMPS

PROJECT-4 x 156.1 MW (ISO) RATING V 94.2 GAS TURBINE POWER PROJECT , RUAIS , LIBYA

BHEL Doc. No.: PE-TDS-552-210-A156

Sheet 1 of 1

A CONTROLLERS DATA

1.00	Manufacturer	CUTLLER HAMMER , CANADA	CUTLLER HAMMER , CANADA
2.00	Quantity	2 NOS. (1 NO. PER PUMP)	2 NOS. (1 NO. PER PUMP)
3.00	Model No.	FDM 30	FD100
4.00	Supply voltage	6600 V \pm 10% , 3 PH AC , 50 HZ + 3% - 5 % , COMBINED VOLTAGE AND FREQUENCY VARIATION 10 %	220 V \pm 10% ,1 PH AC , 50 HZ + 3% - 5 % , COMBINED VOLTAGE AND FREQUENCY VARIATION 10 %
5.00	Enclosure	NEMA 2 (REFER NOTE NO. 1)	NEMA 2 (REFER NOTE NO. 1)
6.00	Approval	UL	UL
7.00	Pump starting on auto manual mode provided	YES	YES
8.00	Whether controller meet NFPA requirement	YES	YES
9.00	Primemover rating	575 HP	575 HP (CLARKE)
10.00	Pressure recorder	PRINTER RECORDER PROVIDED	PRINTER RECORDER PROVIDED
11.00	Space heater	PROVIDED	PROVIDED
12.00	Electrical Protections	a) Current Limiting Fuses b) Locked Rotor Protection c) Overvoltage Alarm d) Undervoltage Alarm e) Phase Reversal	a) Low Lube Oil Pressure Alarm b) Engine Overspped Alarm c) High Temperature Alarm

NOTE NO. 1 : NEMA 2 IS WATER DRIP PROOF (INDOOR) , EQUIVALENT TO IP 54. PLEASE NOTE HOWEVER, IP NOMENCLATURE IS NOT ALLOWED BY NFPA 20 AND FM / UL

NOTE NO. 2 : DIESEL CONTROLLER BATTERY IS CHARGED VIA A BATTERY CHARGER MOUNTED IN THE CONTROLLER AND HAS TO BE PROVIDED WITH 220V AC SINGLE PHASE SUPPLY. THERE IS NO NEED FOR A BATTERY FOR ELECTRICAL OR DIESEL ENGINE CONTROLLER. BATTERIES ARE FOR STARTING THE DIESEL ENGINE ONLY AND BATTERY CHARGERS ARE FOR CHARGING THESE BATERIES FROM THE ELECTRIC SOURCE OF THE CONTROLLER . BATERRY CHARGERS ARE BULT IN THE CONTROLERS AND THERE IS NO NEED FOR EXTRA DETAILS ON THAT AS IT IS AN INTEGRAL PART OF THE CONTROLLER WHICH IS CERTIFIED BY FM/UL AND GUARANTEED BY THE CONTROLER MANUFACTURER.

NOTE NO. 3 : AMMETER IS IN THE MICROPROCESSOR DISPLAY

9.0 TECHNICAL DATA SHEET FOR PRESSURE SWITCH**PROJECT-4 x 156.1 MW (ISO) RATING V 94.2 GAS TURBINE POWER PROJECT , RUAIS , LIBYA****BHEL Doc. No.: PE-TDS-552-210-A043****Sheet 1 of 1**

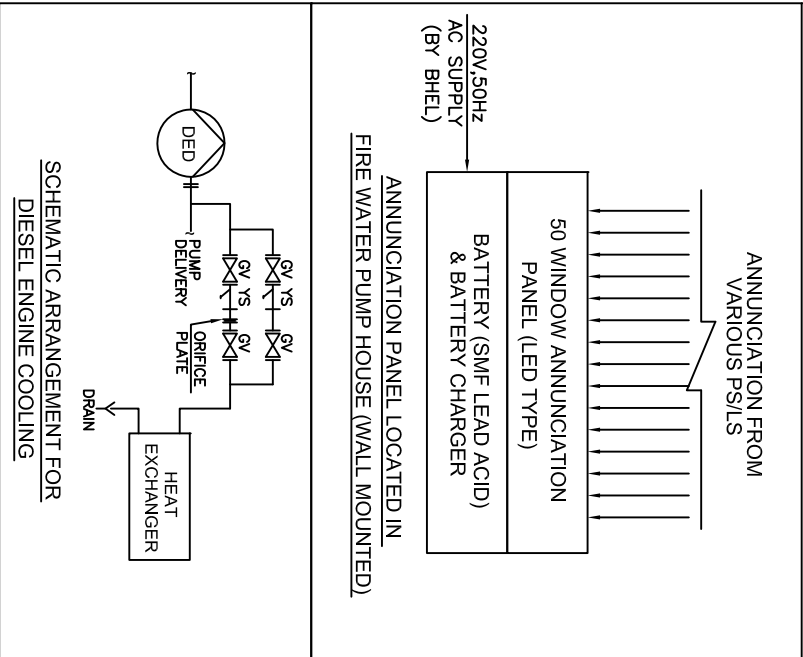
A	GENERAL	
1.00	MANUFACTURER	: NORGREN-HERION
2.00	MODEL NO	: 880420
B	TECHNICAL	
1.00	TYPE OF ELEMENT	: DIAPHRAGM
2.00	MATERIAL OF ELEMENT	: ALUMINIUM
3.00	CASE	: PR. DIE CAST ALUMINIUM
4.00	ENCLOSURE	: WEATHER PROOF IP-66
5.00	SWITCH TYPE	: MICRO-SWITCH
6.00	SWITCH CONTACT	: 1 NO. SPDT (1NO + 1NC)
7.00	SWITCH RATING	5A 230V AC
8.00	SETTING & DEAD BAND	: ADJUSTABLE
9.00	MOUNTNG	: PANEL OR RACK MOUNTING
10.00	OVER RANGE PROTECTION	: 150 % OF RANGE
C	PERFORMANCE	
1.00	SCALE ACCURACY	: +/-5% OF FSR
2.00	REPEATABILITY	: +/-3% OF FSR
D	CONNECTION	
1.00	PRESSURE CONNECTION	: 1/4" NPT (F)
2.00	ELECTRICAL CONNECTION	: PG11 WITH CABLE GLAND
3.00	INSTALLATION ACCESSORIES	: AS PER BHEL SPEC (ACCESSORIES WILL BE SUPPLIED SPERATELY BY SIL
E	OTHER DETAILS	
1.00	PRESSURE RANGE	: 1 - 16 BAR
2.00	SWITCHING PR. DIFFERENCE	: LOWER RANGE - 0.30BAR UPPER RANGE - 0.90BAR
3.00	WEIGHT	: 0.2 KG

TECHNICAL DATA SHEET FOR LEVEL SWITCH FOR HP TANK			
PROJECT-4 x 156.1 MW (ISO) RATING V 94.2 GAS TURBINE POWER PROJECT , RUAIS , LIBYA			
BHEL Doc. No.: PE-TDS-552-210A047		Sheet 1 of 1	
1.0	ITEM TAG NOS.	: LS-HPT-01	LS-HPT-02
2.0	MAKE	: SIGMA INSTRUMENTS COMPANY, MUMBAI	SIGMA INSTRUMENTS COMPANY, MUMBAI
3.0	SERVICE	: Fire Water Tank	Fire Water Tank
4.0	SPECIFIC GRAVITY	: 1.0	1.0
5.0	MAX OPERATING PRESSURE	: 15 Kg /Cm ²	15 Kg /Cm ²
6.0	MAX OPERATING TEMP.	: 45 ⁰ C	45 ⁰ C
7.0	HYDROSTATIC PRESSURE	: 22.5 Kg /Cm ² (for Displacer)	22.5 Kg /Cm ² (for Displacer)
8.0	TANK DEPTH	: 4.6 Mtrs	4.6 Mtrs
9.0	TYPE	: Top Mounted Displacer Level Switch	Top Mounted Displacer Level Switch
10.0	DISPLACER	: SS 316	SS 316
11.0	WIRE ROPE	: SS 316	SS 316
12.0	PROCESS FLANGE	: ASTM A 105	ASTM A 105
13.0	ENCLOSURE PROTECTION	: Weather Proof to IP - 65	Weather Proof to IP - 65
14.0	SWITCH HOUSING	: Base - Aluminium Cover- Mild Steel	Base - Aluminium Cover- Stainless Steel
15.0	TYPE SWITCH	: Micro Switch Snap Acting Magnetically Operated	Micro Switch Snap Acting Magnetically Operated
16.0	SWITCH DIFFERENTIAL	: 75 ± 10 mm	75 ± 10 mm
17.0	REPEATABILITY	: ± 10 mm	± 10 mm
18.0	SET POINT	: Adjustable throught the wire length	Adjustable throught the wire length
19.0	CONTACT RATING	: 5A @ 230 V AC / 0.25A @ 220 V DC	5A @ 230 V AC / 0.25A @ 220 V DC
20.0	SWITCH CONTACT	: 2 SPDT (2 N.O. + 2 N.C. Contacts)	2 Nos. SPDT (2 N.O. + 2 N.C. Contacts)
21.0	PROCESS CONNECTION	: 4" Flanged ANSI B16.5 150 # RF	4" Flanged ANSI B16.5 150 # RF
22.0	CABLE ENTRY	: 3/4 " NPT(F) - 2 Nos.	3/4 " NPT(F) - 2 Nos.
23.0	NO. OF DISPLACERS	: 3 Nos	2 Nos
24.0	DIAMETER OF DISPLACER	: 60 mm (Approx.)	60 mm (Approx.)
25.0	H.V/IR TEST	: As per Switch Mfrs. /Catalogue	As per Switch Mfrs. /Catalogue
26.0	HYDRO TEST FOR DISPLACER	: In water	In water
27.0	QUANTITY	: 1 No.	1 No.
28.0	DOCUMENTS FORMING PART OF THIS DATA SHEET		
28.1	DRAWING NO.	: SI/TMLS-AB/00 Rev 00	TMLS-B-00 Rev 00

PRESSURE/LEVEL SWITCH SCHEDULE FOR MAKE UP WATER PUMP 1,2,3			
Sr. No.	WINDOW NO.	WINDOW INDICATION	SET POINT LEVEL (mm)
1.	WN-A	WATER RUNNING	PS19
2.	WN-B	WATER FAIL TO START	PS19
3.	WN-C	WATER RUNNING	PS20
4.	WN-D	WATER FAIL TO START	PS20
5.	WN-E	WATER RUNNING	PS21
6.	WN-F	WATER FAIL TO START	PS21

Sr. No.	WINDOW NO.	WINDOW INDICATION	SET POINT LEVEL (mm)
1.	WN1	WATER RUNNING	PS19(N)
2.	WN2	WATER FAIL TO START	PS19(N)
3.	WN3	WATER RUNNING	PS20(N)
4.	WN4	WATER FAIL TO START	PS20(N)
5.	WN5	WATER RUNNING	PS21(N)
6.	WN6	WATER FAIL TO START	PS21(N)

Sr. No.	WINDOW NO.	WINDOW INDICATION	SET POINT LEVEL (mm)
1.	WN1	WATER RUNNING	PS19(N)
2.	WN2	WATER FAIL TO START	PS19(N)
3.	WN3	WATER RUNNING	PS20(N)
4.	WN4	WATER FAIL TO START	PS20(N)
5.	WN5	WATER RUNNING	PS21(N)
6.	WN6	WATER FAIL TO START	PS21(N)



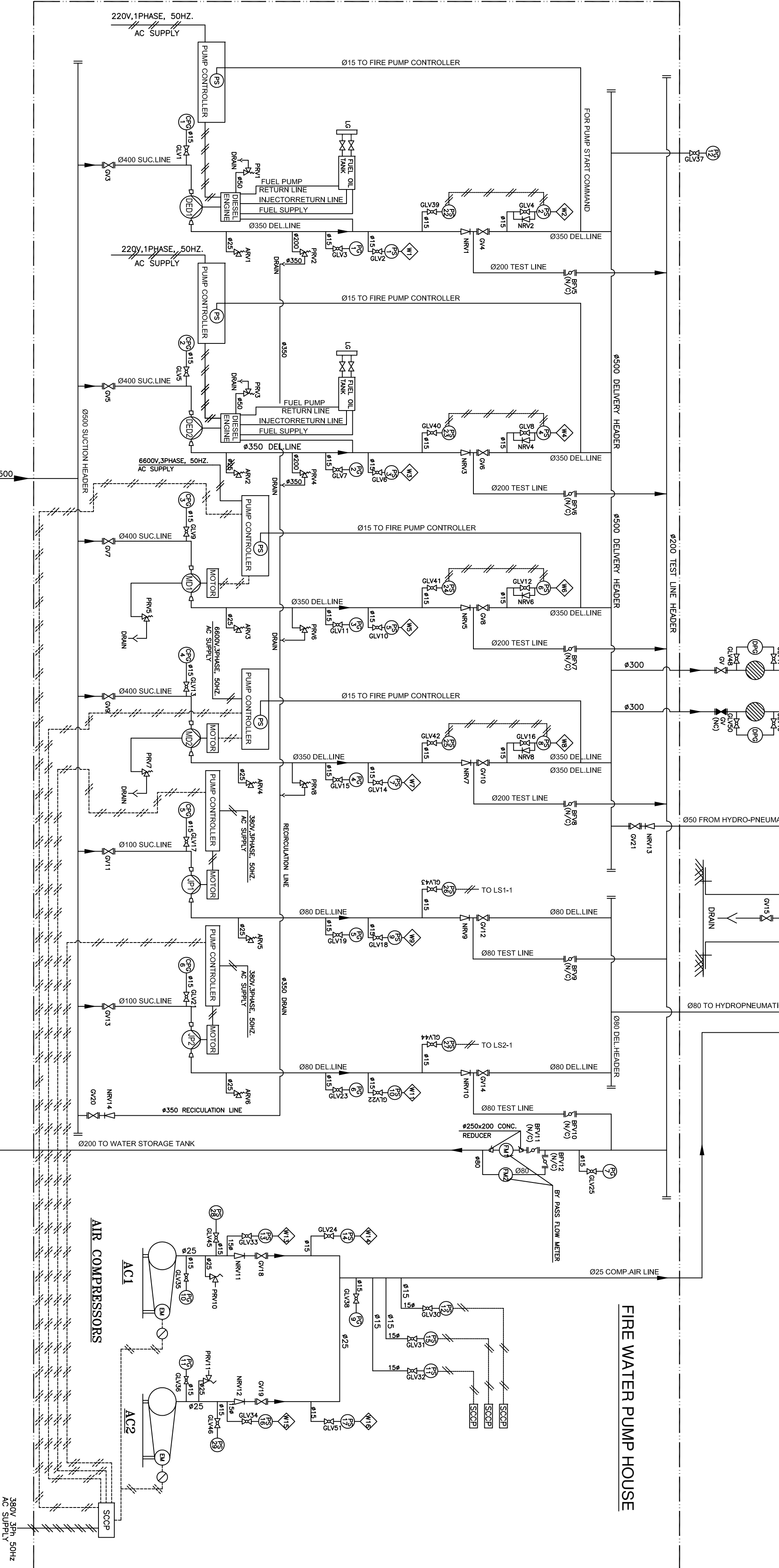
Sr. No.	LOCATION	RANGE	QTY.
1.	DELIVERY OF PUMP	0-16	6 NOS.
2.	ON TEST LINE HEADER	0-16	1 NO.
3.	ON HP TANK	0-16	1 NO.
4.	DELIVERY OF AIR COMP.	0-16	3 NOS.
5.	PUMP DELIVERY HEADER	0-16	1 NO.
6.	SECTION OF THE PUMP	-2 TO 7	6 NOS.

TAG NO.	LOCATION	SETTING
PS1 & 2	DELIVERY OF PUMP	9.8
PS3 & 4	ON TEST LINE HEADER	9.8
PS5 & 6	ON HP TANK	11.75
PS7 & 8	DELIVERY OF AIR COMP.	11.5

Sr. No.	WINDOW NO.	WINDOW INDICATION	SOURCE PLS.	SET POINT LEVEL (mm)
1.	WN1	WATER RUNNING	PS1(N)	3.0
2.	WN2	WATER FAIL TO START	PS2(N)	3.0/5.5
3.	WN3	WATER RUNNING	PS3(N)	3.0/5.5
4.	WN4	WATER FAIL TO START	PS4(N)	3.0/5.5
5.	WN5	WATER RUNNING	PS5(N)	3.0/5.5
6.	WN6	WATER FAIL TO START	PS6(N)	3.0/5.5
7.	WN7	WATER RUNNING	PS7(N)	3.0/5.5
8.	WN8	WATER FAIL TO START	PS8(N)	3.0/5.5
9.	WN9	WATER RUNNING	PS9(N)	3.0/5.5
10.	WN10	WATER FAIL TO START	PS10(N)	3.0/5.5
11.	WN11	WATER RUNNING	PS11(N)	3.0/5.5
12.	WN12	WATER FAIL TO START	PS12(N)	3.0/5.5
13.	WN13	WATER RUNNING	PS13(N)	3.0/5.5
14.	WN14	WATER FAIL TO START	PS14(N)	3.0/5.5
15.	WN15	WATER RUNNING	PS15(N)	3.0/5.5
16.	WN16	WATER FAIL TO START	PS16(N)	3.0/5.5
17.	WN17	WATER RUNNING	PS17(N)	3.0/5.5
18.	WN18	WATER FAIL TO START	PS18(N)	3.0/5.5
19.	WN19	WATER RUNNING	PS19(N)	3.0/5.5
20.	WN20	WATER FAIL TO START	PS20(N)	3.0/5.5
21.	WN21	WATER RUNNING	PS21(N)	3.0/5.5
22.	WN22	WATER FAIL TO START	PS22(N)	3.0/5.5
23.	WN23	WATER RUNNING	PS23(N)	3.0/5.5
24.	WN24	WATER FAIL TO START	PS24(N)	3.0/5.5
25.	WN25	WATER RUNNING	PS25(N)	3.0/5.5
26.	WN26	WATER FAIL TO START	PS26(N)	3.0/5.5
27.	WN27	WATER RUNNING	PS27(N)	3.0/5.5
28.	WN28	WATER FAIL TO START	PS28(N)	3.0/5.5

Sr. No.	SYMBOL	DESCRIPTION	Sr. No.	SYMBOL	DESCRIPTION
1.	— —	BATTERY VALVE NORMALLY CLOSED (BVC)	17.	— —	LEVEL SWITCH
2.	— —	BATTERY VALVE NORMALLY OPEN (BVO)	18.	— —	PRESSURE SWITCH
3.	— —	GLUE VALVE NORMALLY CLOSED (GVC)	19.	— —	COMPOUND PRESSURE GAUGE
4.	— —	GLUE VALVE NORMALLY OPEN (GVO)	20.	— —	LEVEL INDICATOR CUM LEVEL SWITCH
5.	— —	NON RETURN VALVE (NRV)	21.	— —	LEVEL GAUGE
6.	— —	DATE VALVE NORMALLY OPEN (DO)	22.	— —	LEVEL GAUGE
7.	— —	DATE VALVE NORMALLY CLOSED (DC)	23.	— —	LEVEL GAUGE
8.	— —	DATE VALVE NORMALLY OPEN (DO)	24.	— —	LEVEL GAUGE
9.	— —	DATE VALVE NORMALLY CLOSED (DC)	25.	— —	LEVEL GAUGE
10.	— —	DATE VALVE NORMALLY OPEN (DO)	26.	— —	LEVEL GAUGE
11.	— —	DATE VALVE NORMALLY CLOSED (DC)	27.	— —	LEVEL GAUGE
12.	— —	DATE VALVE NORMALLY OPEN (DO)	28.	— —	LEVEL GAUGE
13.	— —	DATE VALVE NORMALLY CLOSED (DC)	29.	— —	LEVEL GAUGE
14.	— —	DATE VALVE NORMALLY OPEN (DO)	30.	— —	LEVEL GAUGE
15.	— —	DATE VALVE NORMALLY CLOSED (DC)	31.	— —	LEVEL GAUGE
16.	— —	DATE VALVE NORMALLY OPEN (DO)	32.	— —	LEVEL GAUGE

Sr. No.	TYPE OF PUMP	PLANT SET	PLANT SET
1.	WATER PUMP	WATER PUMP	WATER PUMP
2.	WATER PUMP	WATER PUMP	WATER PUMP
3.	WATER PUMP	WATER PUMP	WATER PUMP
4.	WATER PUMP	WATER PUMP	WATER PUMP
5.	WATER PUMP	WATER PUMP	WATER PUMP
6.	WATER PUMP	WATER PUMP	WATER PUMP
7.	WATER PUMP	WATER PUMP	WATER PUMP
8.	WATER PUMP	WATER PUMP	WATER PUMP
9.	WATER PUMP	WATER PUMP	WATER PUMP
10.	WATER PUMP	WATER PUMP	WATER PUMP
11.	WATER PUMP	WATER PUMP	WATER PUMP
12.	WATER PUMP	WATER PUMP	WATER PUMP
13.	WATER PUMP	WATER PUMP	WATER PUMP
14.	WATER PUMP	WATER PUMP	WATER PUMP
15.	WATER PUMP	WATER PUMP	WATER PUMP
16.	WATER PUMP	WATER PUMP	WATER PUMP
17.	WATER PUMP	WATER PUMP	WATER PUMP
18.	WATER PUMP	WATER PUMP	WATER PUMP
19.	WATER PUMP	WATER PUMP	WATER PUMP
20.	WATER PUMP	WATER PUMP	WATER PUMP
21.	WATER PUMP	WATER PUMP	WATER PUMP
22.	WATER PUMP	WATER PUMP	WATER PUMP
23.	WATER PUMP	WATER PUMP	WATER PUMP
24.	WATER PUMP	WATER PUMP	WATER PUMP
25.	WATER PUMP	WATER PUMP	WATER PUMP
26.	WATER PUMP	WATER PUMP	WATER PUMP
27.	WATER PUMP	WATER PUMP	WATER PUMP
28.	WATER PUMP	WATER PUMP	WATER PUMP
29.	WATER PUMP	WATER PUMP	WATER PUMP
30.	WATER PUMP	WATER PUMP	WATER PUMP
31.	WATER PUMP	WATER PUMP	WATER PUMP
32.	WATER PUMP	WATER PUMP	WATER PUMP



1. CONSTRUCTION OF FIRE WATER PUMP FOUNDATION OF EQUIPMENT ETC. IS PROVIDED BY BHEL.
 2. ALL PRESSURE SWITCHES SHALL BE MOUNTED ON RACKS.
 3. WATER PUMP SHALL BE PROVIDED BY BHEL.
 4. THE SYSTEM IS DESIGNED AS PER NFPA STANDARD.

SIZE	VALVE	QTY	LOCATION	QTY	LOCATION	QTY
150	GLUE VALVE	1	DELIVERY OF PUMP	1	DELIVERY OF PUMP	1
150	GLUE VALVE	1	ON TEST LINE HEADER	1	ON TEST LINE HEADER	1
150	GLUE VALVE	1	ON HP TANK	1	ON HP TANK	1
150	GLUE VALVE	1	DELIVERY OF AIR COMP.	1	DELIVERY OF AIR COMP.	1
150	GLUE VALVE	1	PUMP DELIVERY HEADER	1	PUMP DELIVERY HEADER	1
150	GLUE VALVE	1	SECTION OF THE PUMP	1	SECTION OF THE PUMP	1

Sr. No.	DESCRIPTION
1.	CONSTRUCTION OF FIRE WATER PUMP FOUNDATION OF EQUIPMENT ETC. IS PROVIDED BY BHEL.
2.	ALL PRESSURE SWITCHES SHALL BE MOUNTED ON RACKS.
3.	WATER PUMP SHALL BE PROVIDED BY BHEL.
4.	THE SYSTEM IS DESIGNED AS PER NFPA STANDARD.

COMPUTER FILE NAME :

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VOLUME – III
PRICE FORMAT

4X156 WMGTPP-Libya, Ruwais													
FIRE PROTECTION AND DETECTION SYSTEM													
Suggestive Price Format													
Total lump sum firm price for equipments, comprising of design & engg. Manufacture, testing, painting & duly packed for transportation as per technical specification no. PE-TS-210-552-A002.													
A)													
S.No.	Description of the Item	Make /Part No./Serial No.	Qty	Unit	Unit Price (Ex Work, duly packed) in Rs.	Total Price (Ex Works duly packed) in Rs.	Excise Duty	Customs Duty	CST	Freight Charges (Mumbai port)	Supervision Charges per man day basis for 30 days making Fire water pump House operational in automatic mode at WMGTPP-Libya Site	Service Tax if any on supervision of E&C	Total Price Including supply (FOB Mumbai port) & supervision of E&C with service tax, if any.
1	Pump Controller for Motor driven pump	Cutler Hammer, Canada (Model No.FDM30, S.No.16B9688E)	1	Nos.									
2	Relay Card for Diesel Engine Pump#2 Controller	Cutler Hammer, Canada (Model No. FD100, Serial No. 16B9689D)	1	Nos.									
3	Service kit for Diesel Engine Driven Pump#1	Clark Detroit Diesel, USA (Model No. DDFP08-FH, Serial No.1112338-1)	1	Lot									
a)	Filter Lube Oil		2	Nos.									
b)	Filter, Fuel Primary		2	Nos.									
c)	Filter, Fuel Secondary		2	Nos.									
d)	Air Cleaner Element		2	Nos.									
e)	Engine Oil (SAE 40 weight oil meeting API service designation of CF-2)		22	Liters									
f)	Coolant (coolants meeting ASTM-D4985 specifications for heavy-duty diesel engines)		63	Liters									
g)	Gear Oil	Quantity as required	1	Lot									
4	Service kit for Diesel Engine Driven Pump#2	Clark Detroit Diesel, USA (Model No. DDFP08-FH, S.No.1112338-2)	1	Lot									
a)	Filter Lube Oil		2	Nos.									
b)	Filter, Fuel Primary		2	Nos.									
c)	Filter, Fuel Secondary		2	Nos.									
d)	Air Cleaner Element		2	Nos.									
e)	Engine Oil (SAE 40 weight oil meeting API service designation of CF-2)		22	Liters									
f)	Coolant (coolants meeting ASTM-D4985 specifications for heavy-duty diesel engines)		63	Liters									
g)	Gear Oil	Quantity as required	1	Lot									
5	Relay Card for Tachometer Panel of Diesel Engine #2	Clark Detroit Diesel, USA (Model No. DDFP08-FH, S.No.1112338-2)	1	Nos.									
6	Governor Solenoid for Diesel engine# 1 & 2	Clark Detroit Diesel, USA (Model No. DDFP08-FH, S.No.1112338-1 & 2)	2	Nos.									
7	Pressure Switch for auto operation	NORGREN-HERION/Model No.880420/Equivalent	5	Nos.									
8	Level Switches for HP Tank	Sigma Instruments/Equivalent	2	Nos.									
11	Seaworthy Packing for above parts		1	Lot									
12	Total supply price for above listed items												
13	Import Content (CIF)												
NOTE:													
1	Bidder must submit prices in the Pro Forma duly filled in signed and stamped on every page without any ambiguity. The price shall be written against each item. Term such as "refer covering letter" etc. are not acceptable. Extra sheet may be attached if the space provided is not sufficient.												
2	Price format shall not be changed by the bidder.												
3	Bidder shall furnish absolute values (Rs) instead of percentage (%) against all items in this schedule.												