

PRODUCT STANDARD
AME BHOPAL

AM 54153 REV. 02

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SPECIFICATION FOR FORCED OIL LUBRICATION SYSTEM

IMPORTAT:-

THIS IS THE GENERAL SPECIFICATION FOR FORCED OIL LUBRICATION SYSTEM. THE RATED CAPACITY OF FOL UNIT AND OTHER TECHNICAL PARAMETERS SHALL BE IN ACCORDANCE WITH OUR SCHEMATIC DIAGRAM OF LUBRICATION SYSTEM. IN CASE OF ANY AMBIGUITY THE REQUIREMENTS MENTIONED IN OUR SCHEMATIC DIAGRAM SHALL BE FINAL.

GENERAL:-

LUBRICATION SYSTEM IS REQUIRED FOR CONTINUOUS SUPPLY OF REQUIRED QUANTITY OF FILTERED AND COOLED OIL TO THE BEARINGS OF MOTOR AT REQUIRED PRESSURE. AFTER DELIVER OF THE OIL TO THE BEARINGS IT IS COLLECTED BACK FOR RECIRCULATION. THE ENTIRE EQUIPMENT SHALL BE IN ASSEMBLED CONDITION. A FEW ITEMS ARE TO GO IN LOOSE CONDITION WHICH ARE CONNECTED ONLY WHILE INTERCONNECTING THE LUBRICATING SYSTEM WITH THE MOTOR BEARINGS. OIL TEMPERATURE AT INLET TO BEARING SHALL BE 40 DEG C AND AT OUTLET 50 DEG C (APOROX). LUBRICATING OIL TO BE USED SHALL BE IOC SERVOPRIME -46 OR EQUIVALENT.

MOTOR ARE INSTALLED OUT DOOR WITHOUT ANY COVER IN DUSTY ATMOSPHERE AS IS USUALLY PREVANLENT IN THERMAL POWER STATIONS AND CEMENT PLANTS. THE LUBRICATING SYSTEM SHALL BE LOCATED NEAR TO THE MOTOR BEARINGS HAVING THE SAME ATMOSPHERIC CONDITIONS. IT SHALL THEREFORE BE PROVIDED WITH PROPER DEGREE OF PROTECTION EQUIPMENTS. ALSO THE LUBRICATING SYSTEM SHALL BE LOCATED AT A LEVEL SLIGHTLY LOWER THAN THE MOTOR, SO THAT THE HOT OIL FROM THE MOTOR BEARINGS FLOWS BACK TO THE SYSTEM UNDER GRAVITY FOR RECIRCULATION . FOR THIS PURPOSE A MINIMUM GRADIENT OF 1:30 SHALL BE MAINTAINED BETWEEN THE MOTOR AND THE LUBRICATING SYSTEM.

CAPACITY:-

THE LUBRICATION SYSTEM SHOULD BE CAPABLE OF DELIVERING CONTINUOUSLY THE RATED QUANTITY OF OIL AT A DESIERD PRESSUREOF 0.3 TO 0.5 BAR AT THE MOTOR BEARINGS. NO PRESSURE TOLERNANCE SHALL BE APPLICABLE ON THE RATED CAPACITY OF THE SYSTEM AND AS SUCH THE SYSTEM SHOULD BE CAREFULLY DESIGNED TO ENSURE THIS REQUIREMENT.

SCHEME OF LUBRICATION:-

SCHEME FOR FORCED OIL LUBRICATION WILL BE IN ACCORDANCE WITH OUR SCHEMATIC DIAGRAM ATTACHED. THE LUBRICATION SYSTEM WILL CONSTITUTE OF THE FOLLOWING EQUIPMENTS:-

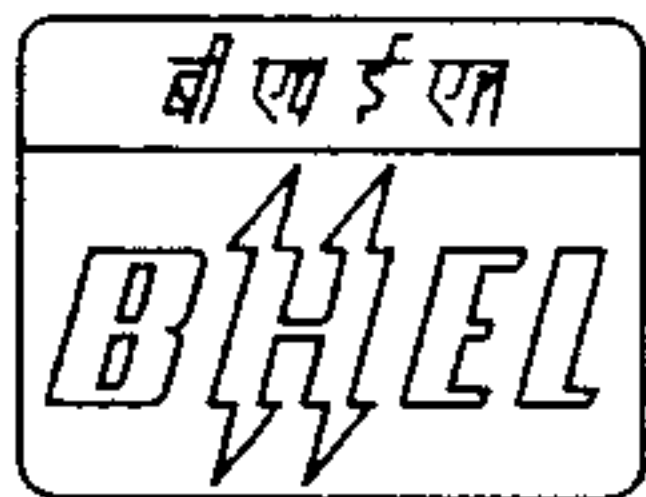
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									<u>SPECIFICATION FOR FORCED OIL LUBRICATION SYSTEM</u>	
			02	19.11.12	CHD. DKD	01	30.01.04	CHD.	DISTRIBUTION AME-1 PLM-3 IMM-3 TEX(PLM)-1 TEX(IMM)-1	
			DRAWING UPDATED			DRG. UPDATED AND REDRAWN.				DRN. LP Sd/- 11.1.90
										CKD. PKS Sd/- 13.1.90
									APPD. SB Sd/- 13.1.90	

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|---|----------------|
| 1. LUBE OIL TANK (WITH ACCESSORIES) | 1 NO. |
| 2. GEAR OIL PUMP ALONG WITH DRIVING MOTOR | 2 NOS. |
| 3. FILTER | 1 NO. |
| 4. COOLER | 2 NOS. |
| 5. PRESSURE RELIEF VALVE | 1 NO. |
| 6. BYPASS FLOW CONTROL VALVE | 1 NO. |
| 7. TEMPERATURE INDICATOR DIAL TYPE | 2 NOS. |
| 8. PRESSURE SWITCH WITH VISUAL INDICATOR | 2 NOS. |
| 9. DIFFERENTIAL PRESSURE SWITCH | 1 NO. |
| 10. PRESSURE GAUGE WITH SHUT OFF VALVE. | 2 NOS. |
| 11. LOCKABLE TYPE REGULATING GLOBE VALVE | 6 NOS. |
| 12. RELIEF VALVE | 2 NOS. |
| 13. GATE VALVE | 12 NOS. |
| 14. NON RETURN VALVE | 2 NOS. |
| 15. OIL LEVEL SWITCH (FOR LOW LEVEL) | 1 NO. |
| 16. OIL LEVEL SWITCH (FOR HIGH LEVEL) | 1 NO. |
| 17. FLOW SWITCH WITH SIGHT GLASS (WITH CONTACT) | 2 NOS. |
| 18. PIPE LINE AND PIPELINE FITTINGS LIKE PLUG VALVES, GATE VALVES, PRESSURE RELIEF VALVES, NON RETURN VALVES, FLANGE DETAILS ETC. | AS PER SCHEME. |

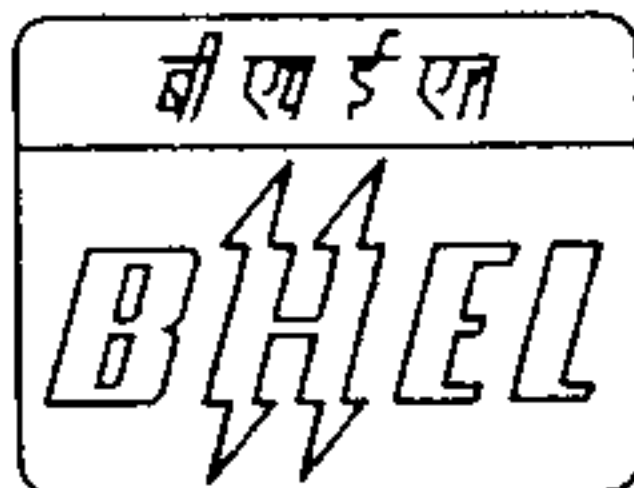
DESCRIPTION OF EQUIPMENT:-

LUBRICATION UNIT SHOULD BE TANK TOP MOUNTED AND SHOULD BE OF COMPACT DESIGN. ALL , INSTRUMENTS AND VALVES ETC. AS SHOWN WITHIN THE CONTINUOUS LINE IN OUR SCHEMATIC DIAGRAM SHOULD BE IN READY CONNECTED IN POSITION . BALANCE OF THE INSTRUMENTS ALONG WITH INTERCONNECTING OIL PIPE LINES AND ASSOCIATED VALVES ETC. MAY BE SUPPLIED IN LOOSE CONDITION. REQUIREMENT REGARDING VARIOUS ITEMS OF LUBRICATING SYSTEM ARE AS UNDER.

1. LUBE OIL TANK:

LUBE OIL TANK PROVIDED IN THE SCHEME WILL BE OF 50 LITRES CAPACITY (APPROX.) IT SHOULD HAVE THE FOLLOWING FEATURES:-

- A) AN OIL FILTER INCORPORATION A FILING AND VENTING FILTER.
- B) DRAIN CONNECTION.
- C) BAFFLE PLATES.
- D) LEVELGAUGE WITH MARKING FOR MAXIMUM AND MINIMUM LEVEL IN THE TANK WITH PROPER PROTECTION WITH BRASS OR STEEL TUBE.
- E) MAN HOLE FOR CLEANING.
- F) HEATER WITH BUILT IN THERMOSTAT OF BIMETAL TYPE. APPROX. CAPACITY SHALL BE 1 KW AND SUITABLE FOR 240 V, 50 Hz SINGLE PHASE AC SUPPLY.
- G) A BAFFLE PLATE IS WELDED INTO THE TANK BETWEEN THE RETURN-OIL PORTION AND SUCTION PORTION.



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H) INLET AND OUTLET FLANGES FOR CONNECTION TO OIL PURIFICATION EQUIPMENT.(IN CASE SO DESIRED BY CUSTOMER).

THE BOTTOM OF THE TANK SHOULD BE INCLINED APPROX-. 5 DEGREES TO WORDS THE OIL DRAIN LOCK FITTINGS ARE PROVIDED ON THE OIL TANK FOR THE INSTALLATION OF IMMERSION HEATER WITH BUILT IN THERMOSTAT AND OIL LEVEL SWITCHES. THE OIL RETURN PIPE IN THE TANK SHOULD EXTEND BELOW THE RESERVOIR NORMAL OIL LEVEL.

2. OIL PUMPS :-

2 NOS. MOTOR DRIVEN GEAR OIL PUMPS SHALL BE PROVIDED, DRIVING MOTOR SHALL BE SQUIRREL CAGE TYPE OF ADEQUATE CAPACITY SUITABLE FOR OPERATION AT 3 PHASE, 415 VOLTS, 50HZ, AC SUPPLY AND AT AN AMBIENT TEMPERATURE OF 50 DEG C. MOTOR SHALL BE TOTALLY ENCLOSED FAN COOLED HAVING IP55 DEGREE OF PROTECTION AS PER IS : 4691. MOTOR SHALL HAVE CLASS F INSULATION WITH TEMPERATURE RISE LIMITED TO CLASS B IN VIEW OF THE DUSTY ATMOSPHERE IN THE CEMENT PLANT. MOTOR SHALL BE OF STANDARD MAKE LIKE CROMPTON GREAVES OR KIRLOSKAR ELECTRIC.

GEAR OIL PUMPS WILL HAVE BUILT IN PRESSURE RELIEF VALVE. ADJUSTMENT OF PRESSURE WITH THE HELP OF RELIEF VALVES AT BEARINGS BETWEEN THE RANGE FROM 0.2 BAR TO 0.5 BAR SHOULD BE POSSIBLE AFTER TAKING INTO ACCOUNT HEAD LOSS IN THE SYSTEM. PRESSURE RELIEF VALVE PROVIDED WITH PUMP WILL PROTECT IT AGAINST ANY EXCESSIVE PRESSURE

COOLERS:-

COOLER'S WILL BE SHELL AND TUBE TYPE WITH BAFFEL PLATES COOLING AREA WILL BE ADEQUATE TO COOL OIL FROM 65 TO 40 DEG C. THE MATERIAL FOR THE COOLER TUBES SHOULD BE SUCH THAT IT IS SUITABLE FOR THE COOLING WATER AVAILABLE AT SITE. THE WATER ANALYSIS MUST BE CONSIDERD FOR DESIGNING OF COOLERS.

THE COOLER SHOULD BE SUITABLE FOR MAXIMUM INLET WATER PRESSURE OF 6KG/SQ. CM. THE SHELL AND TUBE SIDE SHALL BE HYDRAULICALLY TESTED TO 1.5 TIMES THE DESIGN PRESSURE . FOR DESIGN PURPOSE INLET WATER TEMPERATURE MAY BE TAKEN AS 38 DEG C.

4. PRESSURE SWITCH:-

IT WILL BE OF BELLOW TYPE WITH A SINGLE POLE DOUBLE THROW CONTACT. CONTACT RATING WILL BE 5 AMPS AT 240 VOLTS AC POTENTIAL FREE. THE RANGE SHALL BE 0 TO 5 BAR.

5. DIFFERENTIAL PRESSURE SWITCH:-

IT WILL BE BASICALLY THE SAME IN DESIGN AS NORMAL PRESSURE SWITCH. HOWEVER IT WILL HAVE TWO BELLWS INPLACE OF ONE TO PROVIDE DIFFERENTIALPRESSURE. CONTACT WILL BE SINGLE POLE DOUBLE THROW TYPE RATING OF 5 AMPS AT 240 VOLTS AC POTENTIAL FREE.

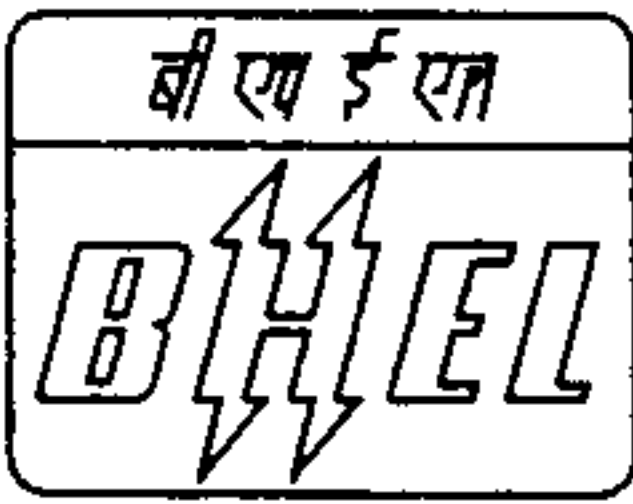
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THE RANGE SHALL BE 0.3 TO 0.5 BAR.

6. FILTER :-

THIS WILL BE OF BASKET TYPE WITH MESH WIRE NETTING. THE FILTER ELEMENT HAS AN APERTURE SIZE OF 20 MICRONS. PRESSURE DROP ACROSS THE FILTER WHEN IT IS FULLY CLEAN SHOULD BE AROUND 0.4 TO 0.5 KG/SQ. CM.

7. FLOW CONTROL VALVE :-

THE SUPPLY LINE INCORPORATES A BYPASS AND REGULATING VALVE, WHICH PERMITS THE ADJUSTMENT OF THE QUANTITY OF OIL FLOWING TO THE BEARINGS BY REGULATING THE VALVE TO RETURNS ANY SURPLUS OIL QUANTITY TO THE TANK. THIS.

SHOULD BE OF PRESSURE COMPENSATION TYPE AND SHALL BY PASS PREDETERMINED AMOUNTS OF OIL UNDER ALL PRESSURE CONDITIONS. IT SHOULD HAVE VISUAL CALIBRATED SCALE AND INDICATOR SO AS TO SET IT FOR BYPASSING A GIVEN AMOUNT OF OIL.

8. TEMPERATURE INDICATOR:-

IT WILL BE A DIAL TYPE TEMPERATURE INDICATOR HAVING RANGE 0 TO 100 DEG C AND ELECTRICAL CONTACTS. THE CONTACT RATING SHALL BE 5 AMPS AT 240 VOLTS AC POTENTIAL FREE . THE INDICATOR SHALL BE OF MERCURY IN STEEL TYPE.

9. PRESSURE GAUGE :-

IT SHOULD BE A STANDARD BOURDAN TYPE PRESSURE GAUGE HAVING A RANGE OF 0 TO 4 BAR. THERE SHALL BE A SHUT OFF VALVE FOR EACH PRESSURE GAUGE.

10. FLOW SWITCH:-

IT IS USED IN THE OIL-INLET PIPE TO THE BEARING, FOR MONITIRING THE FLOW RATE . IT SHOULD HAVE ONE CONTACT WHICH GIVES ALARM IF THE FLOW RATE FALLS BELOW THE SPECIFIED FLOW SETTING. THE CONTACT RATING SHOULD BE 5 AMPS AT 240 VOLTS AC POTENTIAL FREE. IT SHOULD HAVE VISUAL CALIBRATED SCALE AND INDICATOR SHOWING OIL FLOW RATE.

11. OIL LEVEL SWITCH:-

THESE SWITCHES SHOULD BE SUITABLE FOR OPERATING IN OIL TO GRADE IOC SERVOPRIME - 46 AT TEMPERATURE FROM 20 DEG C TO 100 DEG C. UNIT TO BE FITTED WITH 50 DIA. LOCAL DIAL INDICATOR MARKED "NORMAL" AND "LOW" FOR LOW LEVEL SWITCH AND "NORMAL" AND "HIGH" FOR HIGH LEVEL SWITCH. IT SHOULD BE MAGNETIC FLOAT OPERATED. TEST

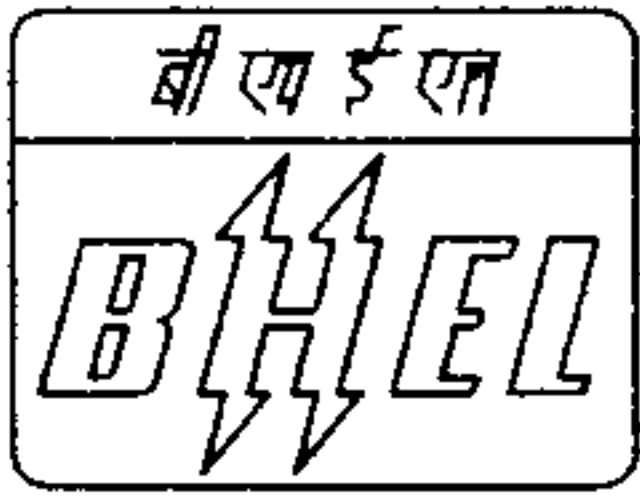
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PRESSURE TO BE 7KG/SQ. CM. IT SHOULD GIVE ALARM AT AN OIL LEVEL -DIFFERENCE OF OIL LEVEL OF 20MM.HIGHER OR LOWER FOR HIGH OR LOW LEVEL SWITCH RESPECTIVELY.

NOTE :-

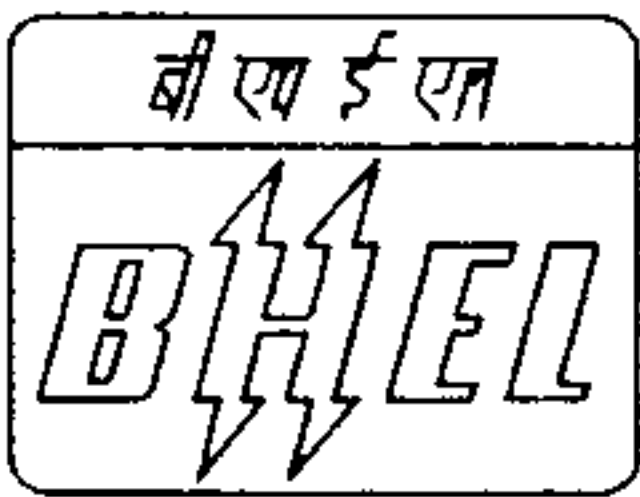
ALL THE INSTRUMENTS SHOULD HAVE WEATHER PROOF CONSTRUCTION AND THESE SHALL BE PROCURED FROM BHEL APPROVED SUPPLIERS ONLY.

SCOPE OF SUPPLY :

COMPLETE LUBRICATING STATION IN COMPACT FRAME MOUNTED WITH ALL EQUIPMENT, INSTRUMENTS, VALVES AND OIL PIPELINE IN ACCORDANCE WITH THE SCHEME OF LUBRICATION IS TO BE SUPPLIED. DESIGN AND CONFIGURATION OF THE PIPELINES CONNECTING THE LUBRICATING STATION WITH THE MOTOR SHALL DEPEND UPON THE RELATIVE LOCATION OF THE TWO. FOR THE PURPOSE OF DESIGNING THE LUBRICATION SYSTEM DISTANCE OF APPROXIMATELY 10M METERS MAY BE ASSUMED. 5 NOS. BENDS EACH OF 90 DEG. IN THE PIPE LINES CONNECTING THE MOTOR WITH THE LUBRICATING STATION MAY ALSO BE PRESUMED.THE INLET AND OUTLET PIPES OF 10 METER LENGTH EACH WITH CORRESPONDING CONNECTORS SUCH AS 5 NOS. ELBOWS, 5 NOS. CONNECTORS (FEMALE ENDS) EACH FOR INLET AND OUTLET PIPE SHOULD BE SUPPLIED ALONGWITH THE FOL UNIT, AS LOOSE.

INFORMATION REQUIRED WITH OFFER:

1. PUMP AND DRIVING MOTOR SPECIFICATION AND THE MAKE. DIMENSIONAL OUTLINE DRAWING OF THE PUMP AND MOTOR SHOWING GENERAL ARRANGEMENT AND TERMINAL BOX DETAILS.
2. COOLER SPECIFICATION AND THE MAKE . AMOUNT AND PRESSURE OF COOLING WATER REQUIRED. WATER INLET AND OUTLET FLANGE DIMENSIONS. PRESSURE DROP IN THE COOLER SHALL BE SPECIFIED.
3. FILTER SPECIFICATION AND THE MAKE EFFICIENCY OF FILTER. MAXIMUM PERMISSIBLE PARTICLE SIZE THAT CAN PASS THROUGH. PRESSURE DROP FOR THE RATED FLOW OF OIL WHEN CLEAN AND WHEN FULLY LOADED I.E. REQUIRES TO BE CLEANED.
4. LUBE OIL TANK DETAILS LIKE CAPACITY AND FEATURES ASSOCIATED WITH THE TANK CAPACITY OF HEATERS ETC. IF ANY.
5. OVERALL DIMENSIONS AND WEIGHT OF THE LUBRICATING UNIT.
6. LIST OF ITEMS INCLUDING VARIOUS INSTRUMENTS, VALVES ETC. TO BE SUPPLIED ALONG WITH BRIEF SPECIFICATION & LEAFLETS.
7. RECOMMENDED LEVEL BELOW THE MOTOR AT WHICH LUBRICATING STATION MUSTBE INSTALLED, ASSUMING THE DISTANCE BETWEEN TWO AS 15 METERS.



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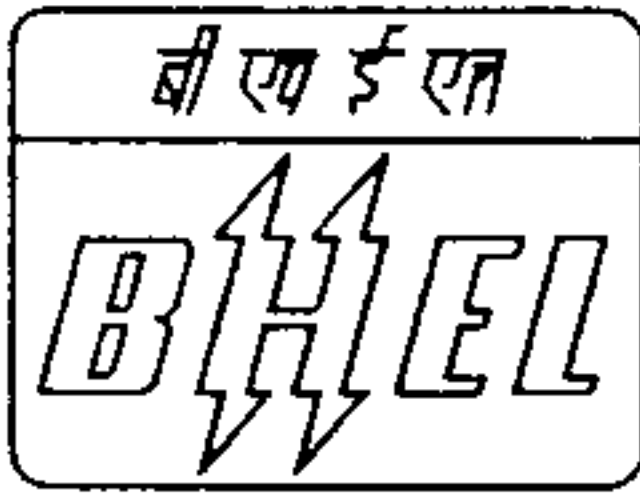
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GENERAL CONDITION :

1. THE FORCED OIL LUBRICATION UNITS SHALL BE INSTALLED IN A CEMENT PLANT OR IN A THERMAL POWER STATION. THE ENVIRONMENT WILL BE CEMENT OR COAL DUST LADEN. THE EQUIPMENT SHALL BE DESIGNED ACCORDINGLY
2. COMPLETE LUBRICATING STATION SHOULD BE COMPACT TANK TOP MOUNTED WITH ALL EQUIPMENT, INSTRUMENTS, VALVES AND OIL PIPE LINES IN SCHEME WILL HAVE IN THE SET POSITION.
3. REGULATING VALVES MOUNTED NEAR TO THE MOTOR BEARINGS AS PER THE SCHEME WILL HAVE IN THE SET POSITION.
4. ALL THE ELECTRICAL CONTACTS OF THE INSTRUMENTS SHOULD BE WIRED UP AND TERMINATED IN A SEPARATE TERMINAL BOX MOUNTED ON THE LUBRICATION UNIT SO THAT FURTHER CABLING TO THE CONTROL PANEL CAN BE EASILY DONE.
5. INSTRUMENTS LYING WITHIN THE CHAIN DOTTED LINE SHOULD BE SUPPLIED IN LOOSE CONDITION. HENCE THE CONNECTION SIZES FOR THOSE FOR THOSE INSTRUMENTS SHOULD BE, SUCH THAT THERE SHOULD NOT BE DIFFICULTY IN THEIR IDENTIFICATION AND PROPER INSTALLATION AT SITE.
6. THE ELECTRICAL CONTACTS OF ALL THE INSTRUMENTS TO BE POTENTIAL FREE AND RATED FOR 5 AMPS. 240 V AC SUPPLY SYSTEM.
7. PROVISION OF AUTOMATIC CHANGE OVER OF THE OPERATING PUMP TO THE STAND BY PUMP, IN CASE OF FAILURE OF OPERATING PUMP.
8. COMPLETE TESTING AND PERFORMANCE OF THE F.O.L SYSTEMS WILL BE SHOWN BY CREATING ACTUAL SITE CONDITIONS TO THE BHEL REPRESENTATIVES BEFORE DESPATCH.
9. THE SYSTEM SHOULD BE ABSOLUTELY FREE FROM AIR LEAKING PROBLEMS IN THE EVENT WHEN ONE PUMP STOPS AND OTHER STAND BY PUMP STARTS AUTOMATICALLY. AIR VENT IN THE FILTER AND AIR BREATHER IN OIL TANK SHOULD BE PROVIDED.
10. INSPECTION WILL BE DONE BY OUR INSPECTOR AT YOUR WORKS.
11. DEMONSTRATION : SUPPLIER SHOULD ARRANGE FREE OF COST COMPLETE RUNNING DEMONSTRATION AND TESTING OF ONE SET F.O.L SYSTEM EXACTLY AS PER OUR SCHEMATIC DIAGRAM AND TECHNICAL SPECIFICATION.



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12. IN CASE OF REJECTION, THE REJECTED MATERIAL WILL BE RETURNED AND THE DOCUMENTS WILL BE NEGOTIATED THROUGH BANK.
13. COMMISSIONING OF THE FOL SYSTEM WILL HAVE TO BE UNDERTAKEN BY THE SUPPLIER OF THE SYSTEM. THE CHARGES FOR THE SAME , IF ANY SHOULD BE INCLUDED IN THE OFFER.
14. SUPPLIER HAS TO GUARANTEE FOR TROUBLE FREE OPERATION UPTO 12 MONTH AFTER COMMISSIONING.

DOCUMENTS TO BE SUPPLIED AFTER PLACEMENT OF ORDER :

1. GENERAL ARRANGMENT DRAWING OF TANK TOP MOUNTED LUBRICATION SYSTEM SHOULD BE SUPPLIED WITHIN ONE MONTH FROM THE DATE OF PLACEMENT OF ORDER.
2. ONE GOOD QUALITY REPRODUCEABLE AND 4 COPIES OF PRINTS SHOULD BE SUPPLIED FOR EACH PROJECT.
3. SCHEDULE OF VALVES AND FITTINGS AND DETAILS OF VARIOUS INSTRUCTIONS AS PER OUR SPECIFICATION SHOULD BE SUPPLIED WITHIN TWO MONTHS.
4. 10 COPIES OF OPERATION AND MAINTENANCE MANUAL ALONG WITH NECESSARY DRAWING FOR EACH PROJECTS SHOULD BE SUPPLIED WITHIN TWO MONTHS. ONE COPY OF OPERATION AND MAINTENANCE MANUAL SHOULD INVARIABLY BE SUPPLIED ALONG WITH THE EQUIPMENT IN THE PACKING CASE.
5. TEST AND GUARANTEE CERTIFICATES ARE REQUIRED AT THE TIME OF SUPPLY.
