

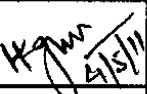
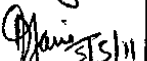
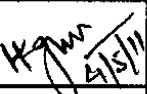
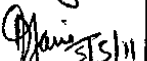
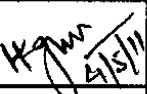
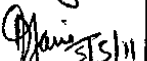


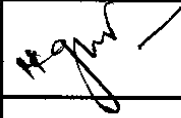







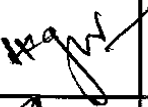



दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;"><b>उत्पाद मानक</b></p> <p style="text-align: center;"><b>STEAM TURBINE ENGINEERING PRODUCT STANDARD</b></p>	<b>ST38013</b>						
सामग्री सूची संख्या को अधिस्तमित करता है SUPERSEDES INVENTORY NO.			पृष्ठ 10 का 2 Page 2 of 10						
COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company		<p>1.9 The discharge branch of the pump shall be taken out above the base plate by the supplier.</p> <p>1.10 The pumps shall be provided with drainage and venting devices.</p> <p>1.11 All pump parts conveying oil shall be of oil tight construction. Compression type fittings are not permissible.</p> <p>1.12 Pump running at subcritical speeds, it shall be ensured that the critical speed lies above the maximum speed attainable during operation with a minimum margin of 15% of rated speed. For pump running at supercritical speeds, it shall be ensured that there is a difference of sufficient magnitude. The margin between the bordering critical speeds and pump rated speed shall be at least 20% of the rated speed. The type of coupling between pump &amp; drive unit is to be taken into account while calculating the critical speeds for bending forces.</p> <p>1.13 Seals are to be designed such that they can be removed and reinstalled several times with out effecting the sealing quality.</p> <p>1.20 <b>COUPLING</b> Coupling shall be preferably pin bush or jaw type. Suitable coupling with guards shall be provided for coupling pump with motor and shall be designed to facilitate easy alignment. One set of coupling pins/ bolts shall be supplied in spare. Coupling shall be preferably outside the pump base plate (towards motor side).</p> <p><b>FOUNDATION</b> The pumps shall be mounted in the oil tank and hung from base plate at the tank top into the tank. For further details please refer the drawing No. attached herewith (STE-TL-001). All the seating machined surfaces of the base plate to be maintained for 0.5 mm flatness.</p> <p>1.40 <b>SPECIAL TOOL &amp; TACKLES</b> One set of tools required for erection , operation and maintenance of the pumping sets shall be supplied together with each pump. List of these tools shall be submitted along with the offer.</p> <p><b>QUALITY ASSURANCE, INSPECTION AND TESTING</b></p> <p>2.1 The manufacturer shall conduct all tests required to ensure all the component parts of the pump offered conform to the requirements of the specification and is in compliance with the requirements of applicable codes and standards.</p> <p>2.2 The bidder shall submit alongwith his offer quality plan in the enclosed format and in line with clause 2.0</p>							
		स्वत्वाधिकार एवं गोपनीय इस प्रलेख में की गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए ।							
दिनांक एवं हस्ताक्षर SIGN & DATE									
सामग्री सूची संख्या INVENTORY NO.	P-5539	REV. NO. 07	<table border="1" style="width: 100%;"> <tr> <td style="width: 33%;">निर्माणकर्ता WORKED BY</td> <td style="width: 33%;">H.GUPTA</td> <td style="width: 33%;"></td> </tr> <tr> <td>जांचकर्ता CHECKED BY</td> <td>ANUJ JAIN</td> <td></td> </tr> </table>	निर्माणकर्ता WORKED BY	H.GUPTA		जांचकर्ता CHECKED BY	ANUJ JAIN	
निर्माणकर्ता WORKED BY	H.GUPTA								
जांचकर्ता CHECKED BY	ANUJ JAIN								


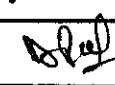

दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;"><b>उत्पाद मानक</b></p> <p style="text-align: center;"><b>STEAM TURBINE ENGINEERING PRODUCT STANDARD</b></p>	<b>ST38013</b>	
सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.		पृष्ठ 10 का 3 Page 3 of 10	<p>2.3 The particulars of the proposed shop tests and procedres for the tests shall be submitted to BHEL / its customer for approval along with quality plan.</p> <p>2.4 The equipment shall be dispatched only after inspection and clearance of material by BHEL/ its customer and approval of test certificates by BHEL/ its customer.</p> <p>2.5 The minimum tests/ checks to be carried out on the pump as envisaged by BHEL are given below. This is however not intended to form a comprehensive testing programme as it is suppliers responsibility to prepare the detailed quality plan, which should also include tests, checks carried out by supplier as a part of their normal practice. This quality plan is subject to the approval of BHEL/ its customer. BHEL/ its customer reserves the right to ask for any more checks at the time of quality plan finalisation.</p> <p>2.5.1 <b>Testing of Materials</b></p> <p>The material of each component shall be tested as per relevant specification for its chemical composition and mechanical properties viz. <b>YS, Impact, %age elongation % RA</b> etc. Suitable NDT to ensure freedom from surface and subsurface defects shall be carried out.</p> <p>2.5.2 Following tests shall be carried out during various stages of manufacturing at manufacturer's works.</p>
स्वत्वधिकार एवं गोपनीय The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	सामग्री सूची संख्या INVENTORY NO.	<p>(a) Check for dimensions of all the component parts including surface finish, axial and radial run out of shaft etc.</p> <p>(b) Non destructive examination DPT/ MPI on machined surfaces of casing and welds of discharge pipe, ultrasonic test on shaft (<math>\geq 50\text{mm}</math>) to be carried out.</p> <p>(c) Dynamic balancing of the rotor as per ISO 1940 (Gr. <b>2.5</b>) or VDI 2060 or equivalent.</p> <p>(d) Pump casing and discharge pipe shall be subjected to hydraulic pressure test at 2 times the working pressure or 1.5 times the pump shut-off head whichever higher. Pump impeller shall be subjected to suitable NDT method like MPI/ DPT for surface defect examination.</p> <p>The pressure test shall be carried out with original bolts. Duration of hydraulic test shall be 30 minutes. The testing should be carried out at manufacturer's works in the presence of BHEL's / customer representative.</p> <p>(e) Performance test shall be carried out with respective unit motor i.e. each pump shall be tested with its motor only. However, in case of D.C. motor the performance test may be carried out with test bed motor. Performance test shall include verification of pump characteristics e.g. discharge Vs pressure, power consumption, efficiency, vibration and noise level etc.</p>		COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.
दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE	
सामग्री सूची संख्या INVENTORY NO.	REV. NO. 07	निर्माणकर्ता WORKED BY	निर्माणकर्ता H.GUPTA	5/2/11
सामग्री सूची संख्या INVENTORY NO.	P-5539	जांचकर्ता CHECKED BY	जांचकर्ता ANUJ JAIN	5/2/11

चक्र सं. एवं दिनांक SIGN & DATE		<b>उत्पाद मानक</b>  <b>STEAM TURBINE ENGINEERING PRODUCT STANDARD</b>	<b>ST38013</b>	
सामग्री सूची संख्या को अधिकारित करता	SUPERSEDES INVENTORY NO.	<p>These tests should be conducted as per DIN1944 class III or equivalent in the presence of BHEL/customer. The characteristics have to be certified by BHEL/customer representative.</p> <p>(f) Strip down examination to check the condition of bearing, mechanical clearances, axial play of the shaft etc.</p> <p>(g) Check the condition of the oil seals and any seepage of oil through the seals.</p>		
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	2.5.3 After testing the pump, all the surfaces and internals shall be thoroughly cleaned, dried and conserved. All metallic surfaces except bright parts exposed to weather shall be given a suitable priming coat and then two coats of approved paints. Ensure assembly of all the components of pump as one unit and pack in water and dust proof package. The packages should be sufficiently strong to safeguard against any damage during transit and is safe for two years in a very damp atmosphere.	2.5.4 Test certificates indicating the test results of material testing NDT, dynamic balancing, hydraulic test, performance test, strip down examination etc. shall be furnished. 2.5.5 Blue matching requirement between tank top and pump base plate shall be part of O&M Manual. 2.5.6 Blue matching between motor base and pump base plate to be ensured.	पृष्ठ 10 का 4 Page 4 of 10	
	3.0 <b><u>PREAPPROVAL DOCUMENTS AT THE TIME OF OFFER</u></b> 3.1 Assembly drawing with parts lists. Nozzle sizes and their coordinates base plate details and cross sectional arrangement along with static and dynamical loading. 3.2 Calculation with necessary drawings (Torque / speed characteristics etc.) power requirement. 3.3 All welding shall be carried by qualified welder as per ASME sec.IX. 3.4 Examination of the pre-approval documents by BHEL shall not release the manufacturing and his subcontractors, of their responsibilities. The approval documents shall form the basis for the order. No changes shall be made without approval from BHEL. 3.5 Quality plan, detailing out various stages of manufacturer along with relevant documents standards, acceptance levels, inspection document raised.			
<b>स्वत्वाधिकार एवं गोपनीय</b> इस प्रलेख में की गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं प्रसारण के बिना की जाये नहीं।	5/2/11			
सामग्री सूची संख्या INVENTORY NO. P-55539	REV. NO. 07		निर्माणकर्ता WORKED BY H.GUP TA	 5/2/11
			जांचकर्ता CHECKED BY A. JAIN	 5/2/11

दिनांक एवं हस्ताक्षर SIGN & DATE		<b>उत्पाद मानक</b>  <b>STEAM TURBINE ENGINEERING PRODUCT STANDARD</b>	<b>ST38013</b>  पृष्ठ <b>10</b> का <b>5</b> Page <b>5</b> of <b>10</b>			
सामग्री सूची संख्या को अधिकारिता करना	SUPERSEDES INVENTORY NO.	<p><b>4.0 DOCUMENTS TO BE SUPPLIED AFTER THE PLACEMENT OF ORDER</b></p> <p>These shall be supplied in 10 copies each or two copies and a set of reproducible.</p> <p>4.1 Contractual drawings : 8 weeks</p> <p>4.2 Overhaul and spare parts lists : 8 weeks</p> <p>4.3 Equipment description : 8 weeks</p> <p>4.4 O &amp; M manual (10 hard copy + 2CD) :12 weeks</p> <p>4.5 Record of test on noise levels before dispatch</p> <p>4.6 Record of test to DIN 1944-III or equivalent : Before dispatch or equivalent.</p> <p>4.7 List of tools and tackles : 8 weeks</p> <p>4.8 The static/ dynamic loading details on support/ foundation should be furnished : 8 weeks</p> <p><b>5.0 NAME PLATE IDENTIFICATION MARKING SHOULD BE AS FOLLOWS</b></p> <p>The rating plate is to be made of <b>X12</b> or <b>Ni188</b> and plates should be provided in Hindi and English both.</p> <p>5.1 Type/ Designation.</p> <p>5.2 Manufacturer.</p> <p>5.3 Manufacturer's works No.</p> <p>5.4 Year of manufacturing.</p> <p>5.5 Purchaser's order No.</p> <p>5.6 Volumetric flow ( l / m )</p> <p>5.7 Discharge pressure (Bar/MWC)</p> <p>5.8 Operating temp ( In degree C)</p> <p>5.9 Flow medium.</p> <p>5.10 Speed.</p>				
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company						
<b>स्वत्वाधिकार एवं गोपनीय</b> इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए ।						
हस्ताक्षर एवं दिनांक SIGN &	5/2/11					
सामग्री सूची संख्या INVENTORY NO.	P-5539	REV. NO. 07	निर्माणकर्ता WORKED BY	H.GUPTA		5/2/11
			जांचकर्ता CHECKED BY	A. JAIN		5/2/11

दिनांक एवं प्रस्ताव SIGN & DATE		<b>उत्पाद मानक</b>  <b>STEAM TURBINE ENGINEERING PRODUCT STANDARD</b>	<b>ST38013</b>  पृष्ठ 10 का 6 Page 6 of 10			
सामग्री सूची संख्या को अधिकतम करता	SUPERSEDES INVENTORY NO.	<p>6.0 <b>CLEANING &amp; PAINTING, CONSERVATION, PACKING</b>          The surface shall be thoroughly cleaned of all mill scales, oxide and other coatings. The protective coating should be oil resistant to prevent contamination of oil specified and to prevent the deterioration of the coating itself. The supplier shall give exact and precise details about the measures envisaged by him for internal and external surface protection, which shall be checked &amp; approved by BHEL/ Owner. All surfaces, which will not be easily accessible after the shop assembly shall before hand be treated and protected for life of the equipment.          Instructions should be issued regarding reconsevation, deconsevation and storage of package.          Contractor shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.</p> <p>6.1 In the packing list, dispatchable unit, BHEL P.O.number, Project name should be mentioned.</p> <p>6.2 O&amp;M manual should be mentioned in the packing list.</p> <p>6.3 A check list should be prepared with a column for tick marking, so that check list convert to an erection/commissioning reports. This check list should be part of O&amp;M manual.</p> <p>6.4 Lock washers shall be supply with all fasteners</p> <p>7.0 <b>GENERAL</b>          The tenderer can make suitable offers even if there are minor deviations which do not effect the efficient functioning of the equipment. However the deviations must be clearly spelt out. Supplier shall also fill in the blank data sheet as per Annexure-I and submit the same along with the offer. The offer may not be considered if all the technical particulars and information called for in the specifications are not submitted along with the offer.</p> <p>7.0 <b>GUARANTEE</b>          7.1 The supplier shall guarantee trouble free and satisfactory operation of the equipment for a period of 12 months after the installation and commissioning or for a period of 18 months from the day the equipment leaves the supplier's works.</p> <p>7.2 The supplier shall guarantee the capacity, head and efficiency of the pump as per the tested characteristics with oil.</p> <p>7.3 If during erection at site any deficiency in a part is detected, BHEL site representative to shall prepare the assessment report and a copy of the same shall be forwarded the supplier. The supplier shall replace/ rectify the concerned items free of charge within a week time after receipt of assessment report. The supplier if he so desire, may depute his representatives to site at his own cost otherwise the findings of BHEL representative shall be final and binding on the supplier of pumping set.</p> <p>7.4 The supplier shall repair/replace the defective parts at his own cost during the guarantee period.</p> <p>9.0 <b>SPARES</b>          The supplier shall quote item wise price of recommended spares for 3 years and 5 years operation respectively.</p>				
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company						
<b>स्वत्वाधिकार एवं गोपनीय</b> इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इस्का प्रयुक्त एवं आरक्षक रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए ।						
निर्माकर एवं दिनांक	5/2/11					
सामग्री सूची संख्या INVENTORY	P-5539	REV. NO. 07	निर्माणकर्ता WORKED BY	H.GUPTA		5/2/11
			जांचकर्ता CHECKED BY	A. JAIN		5/2/11



SIGN & DATE		<b>उत्पाद मानक</b> <b>STEAM TURBINE ENGINEERING</b> <b>PRODUCT STANDARD</b>		<b>ST38013</b>	
				पृष्ठ 10 का 8 Page 8 of 10	
SKETCHES INVENTORY NO.	2.5 Shut off head.				
अक्षांश क्रमांक of sketch/serial	2.6 Performance guarantee when installed as per given arrangement.		Yes/No		
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly, in any way detrimental to the interest of the company.	2.6 Pump B.H.P./KW at rated capacity.				
	2.7 Maximum allowable suction lift (for minimum NPSH REQUIRED).				
	2.9 Efficiency.				
	3.0 <b><u>MATERIAL OF CONSTRUCTION</u></b>				
	3.1 Casing.				
	3.2 Impeller.				
	3.3 Base plate.				
	3.4 Wearing rings				
	3.5 Shaft				
	3.6 Stuffing box.				
	3.7 Packing.				
	3.8 Mechanical seal.				
	4.0 <b><u>CONNECTION</u></b>				
	4.1 Suction size.				
	4.2 Discharge size.				
5.0 <b><u>DRAWINGS</u></b>					
5.1 General arrangement and sectional drawings enclosed with offer.		Yes/No			
स्वत्वधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारी इलेक्ट्रिकल्स लि. की संपत्ति है। इसका उपयोग बिना लिखित अनुमति के बिना नहीं किया जानना चाहिए।	दिनांक DATE: 2/9/06				
समीक्षा P-5539	REV. NO. 07	निर्माणकर्ता WORKED BY D.PAL		16/06/06	
		जांचकर्ता CHECKED BY A. JAIN		16/6/06	





उत्पाद मानक

ST38013

STEAM TURBINE ENGINEERING  
PRODUCT STANDARD

पृष्ठ 10 का 9  
Page 9 of 10

COPYRIGHT AND CONFIDENTIAL

The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.

स्वाधिकार एवं गोपनीय

इस दस्तावेज में दी गई सूचना भारत भारती इलेक्ट्रिकल्स लि. की संपत्ति है। इसका प्रयोग केवल इलेक्ट्रिकल्स लि. के ही उपयोग के लिए ही किया जा सकता है। इसका प्रयोग अन्य किसी भी उद्देश्य के लिए नहीं किया जा सकता है।

6.0 WEIGHT SCHEDULE

- 6.1 Weight of pump.
- 6.2 Weight of motor.
- 6.3 Weight of pump with motor and base frame.

7.0 CHARACTERISTIC CURVES

- 7.1 Power consumption / discharge flow.
- 7.2 Discharge quantity / Pressure.
- 7.3 Discharge / efficiency.
- 8.0 Any deviation taken against specifications. Yes/No
- 9.0 Deviation taken as mentioned here.

10.0 CONSTRUCTION FEATURES

- 10.1 Type of pumps.
- 10.2 No. of stages.
- 10.3 Type of impeller.
- 10.4 Type of stuffing box sealing offered.
- 10.5 Type of coupling offered.
- 10.6 Type of bearing and lubrication.
- 10.7 Impeller diameter.
- 11.0 Cross referred Standards: Nil

REV. NO. 07

INVENTORY NO  
P-55-39

REV. NO. 07

निर्माणकर्ता WORKED BY	D.PAL		16/06/06
जांचकर्ता CHECKED BY	A. JAIN		16/06/06

निर्माक एवं तिथि  
SIGN & DATE

समग्री सूची संख्या को  
अधिकृतित करता है

**COPYRIGHT AND CONFIDENTIAL**  
The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.

स्वत्वधिकार एवं गोपनीय  
इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इस्तेमाल के बिना इस सूचना को किसी भी तरह प्रयोग, जो कि कंपनी के हित में स्वत्वधिकार को न किया जाए।

निर्माक एवं तिथि  
SIGN & DATE  
23/7/11

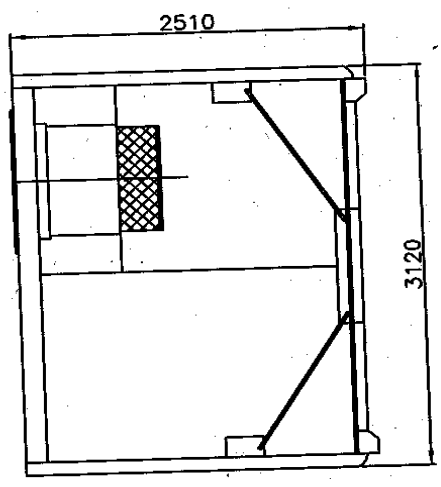
समग्री सूची संख्या  
INVENTORY NO.  
P-5539



**उत्पाद मानक**  
**PRODUCT STANDARD**  
(STEAM TURBINE ENGINEERING)

**ST-38013**  
पृष्ठ 10 का 10  
**Page 10 Of 10**

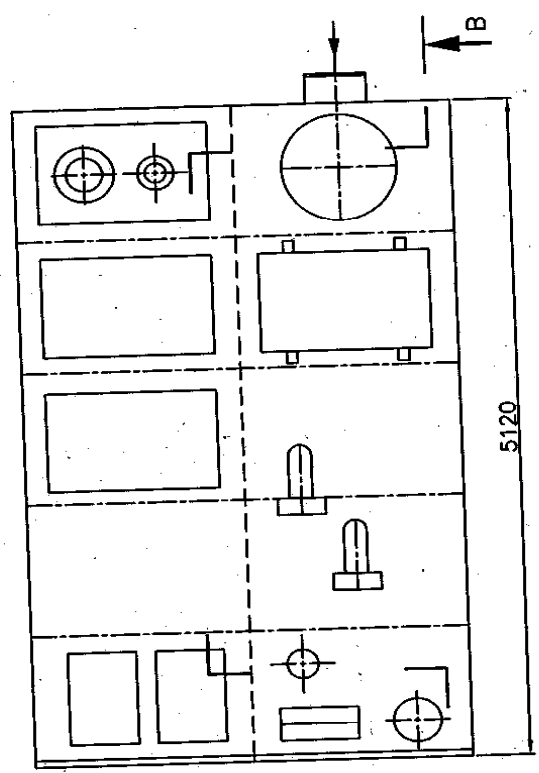
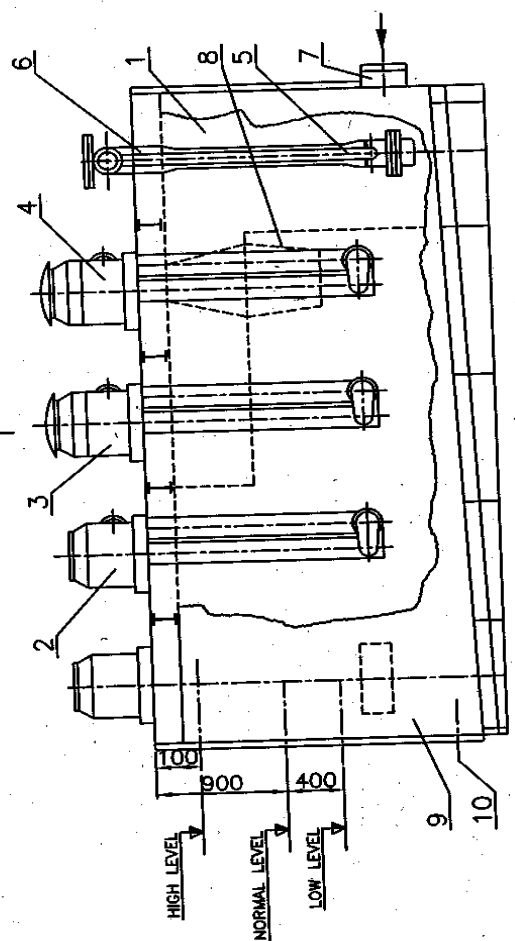
**SECTION A-A**



1. TANK.
2. D.C. BEARING OIL PUMP.
3. A.C. AUXILIARY OIL PUMP.
4. A.C. AUXILIARY STAND BY OIL PUMP.
5. INJECTION PIPE.
6. SUCTION PIPE (INJECTOR).
7. INLET.
8. STRAINER.
9. PARTITION.
10. DRAIN.

**OIL TANK ARRANGEMENT**  
DRG. NO. STE-TL-001

**SECTION B-B**



REV. NO.  
**07**

**SUPERSEDES**

निर्माककर्ता  
WORKED BY  
जांचकर्ता  
CHECKED BY

H.GUPTA  
ANUJ JAIN

Hg  
Jain

14/7/11  
14/7/11