





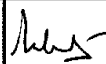


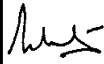

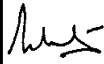

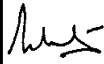



दिनांक एवं हस्ताक्षर SIGN & DATE		<b>उत्पाद मानक</b>  <b>PRODUCT STANDARD</b> ( STEAM TURBINE ENGINEERING )		<b>ST- 39011</b>																	
				पृष्ठ 1 का  Page 1 of 9																	
सुपरसेड्स INVENTORY NO.	<b>TECHNICAL SPECIFICATION FOR GENERAL PUMPING SETS</b>																				
सामग्री सूची संख्या को अधिकृत किया गया है	<b>1.0 INTENT OF SPECIFICATION :</b>  This technical delivery specification shall apply to pumps in the Turbine plant system which are not covered by a special specification and have the motor rating less than 5 KW.  This specification is intended to cover design, manufacture , assembly, testing and supply of pumping sets complete with foundation base plate, anchor bolts, lifting lugs, couplings, pressure gauges/limiting valve and other accessories including motor and their commissioning at power station to which BHEL supplies the equipment.																				
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this document 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>2.0 COMPLIANCE TO NATIONAL / INTERNATIONAL STANDARDS :</b>  <b>PUMP :</b> DIN 6774, DIN 19052, DIN 19055, EN10204, VDMA 24284. <b>MOTOR:</b> IS:4722, IS:325, IS:2253, IS:1271, IS:12065 & IS:12075 or equivalent BS/DIN/IEC standards.																				
स्वतंत्रता एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल केवल के लिए ही किया जाना चाहिए। किसी भी प्रकार के बिना अनुमति के इसमें संशोधन नहीं किया जा सकता है।	<b>3.0 TECHNICAL DATA:</b>  For technical data of pump, see data sheet.																				
दिनांक एवं हस्ताक्षर SIGN & DATE	<b>4.0</b> A suitable motor confirming to the pump requirement shall be supplied. The motor shall also meet following requirements broadly.																				
सामग्री सूची संख्या INVENTORY NO.	<b>4.1 TYPE:</b> Squirrel cage , induction motor.																				
सामग्री सूची संख्या INVENTORY NO.	<b>4.2 RATING:</b> Continuous rating shall be at least 15% above the maximum load demand of the driven equipment.																				
दिनांक एवं हस्ताक्षर SIGN & DATE	<table border="1"> <tr> <td>नाम NAME</td> <td>दिनांक एवं हस्ताक्षर SIGNATURE &amp; DATE</td> </tr> <tr> <td>अनुवादक TRANSLATED BY</td> <td>-</td> </tr> <tr> <td>निर्माणकर्ता WORKED BY</td> <td>Vinod Kumar 24.5.03</td> </tr> <tr> <td>जांचकर्ता CHECKED BY</td> <td>K.B.Batra 24.5.03</td> </tr> <tr> <td>पर्यवेक्षणकर्ता SUPERVISED BY</td> <td>K.B.Batra 24.5.03</td> </tr> <tr> <td>स्वीकृति APPROVED :</td> <td>28/5/03 (A.ALI)</td> </tr> <tr> <td>निर्माण PREPARED : STE</td> <td>जारी ISSUED : TSX</td> </tr> <tr> <td>दिनांक DATE : 25.1.84</td> <td></td> </tr> </table>					नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE	अनुवादक TRANSLATED BY	-	निर्माणकर्ता WORKED BY	Vinod Kumar 24.5.03	जांचकर्ता CHECKED BY	K.B.Batra 24.5.03	पर्यवेक्षणकर्ता SUPERVISED BY	K.B.Batra 24.5.03	स्वीकृति APPROVED :	28/5/03 (A.ALI)	निर्माण PREPARED : STE	जारी ISSUED : TSX	दिनांक DATE : 25.1.84	
नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE																				
अनुवादक TRANSLATED BY	-																				
निर्माणकर्ता WORKED BY	Vinod Kumar 24.5.03																				
जांचकर्ता CHECKED BY	K.B.Batra 24.5.03																				
पर्यवेक्षणकर्ता SUPERVISED BY	K.B.Batra 24.5.03																				
स्वीकृति APPROVED :	28/5/03 (A.ALI)																				
निर्माण PREPARED : STE	जारी ISSUED : TSX																				
दिनांक DATE : 25.1.84																					
सामग्री सूची संख्या INVENTORY NO.	<table border="1"> <tr> <td>सहमत विभाग AGREED DEPTT.</td> <td>नाम NAME</td> <td>दिनांक एवं हस्ताक्षर DATE &amp; SIGNATURE</td> </tr> <tr> <td>REV. 03</td> <td></td> <td></td> </tr> <tr> <td>DATE 12.4.06</td> <td></td> <td></td> </tr> </table>					सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	REV. 03			DATE 12.4.06									
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE																			
REV. 03																					
DATE 12.4.06																					

दिनांक एवं हस्ताक्षर SIGN & DATE		<b>उत्पाद मानक</b>  <b>PRODUCT STANDARD</b> ( STEAM TURBINE ENGINEERING )	<b>ST- 39011</b>	
			पृष्ठ 2 का Page 2 of 9	
संपूर्ण सूची संख्या को अधिकृत करता है SUPERSEDES INVENTORY	<p><b>4.3 <u>RATED VOLATGE:</u></b></p> <p>415V AC, 50Hz, 3 Phase</p> <p><b>4.4 <u>PERMISSIBLE VOLTAGE AND FREQUENCY VARIATION:</u></b></p> <p>415 V +/- 10% , 50Hz +/- 5%,          Combined voltage &amp; frequency variation <math>\leq</math> 10% ( absolute sum)</p> <p><b>4.5 <u>TYPE OF DUTY:</u></b></p> <p>Continuous.</p> <p><b>4.6 <u>FULL LOAD SPEED:</u></b></p> <p>Commensurate with the requirement of driven pump.</p> <p><b>4.7 <u>AMBIENT:</u></b></p> <p>The motor shall be suitable for continuous operation at an ambient temp. of 50 deg. C. &amp; 90% humidity.</p> <p><b>4.8 <u>STARTING CONDITIONS:</u></b></p> <p>a) Motor shall be suitable for direct on line (DOL) starting.          b) Motor shall be capable to start with full load even at 80% of rated voltage.          c) Starting current shall be less than 6 times the rated current.          d) Motor shall be capable to withstand electro-dynamic stresses and heating if it is started at 110% of rated voltage.          e) Motor shall be capable to withstand two successive starts in hot condition, with motor initially at normal running temperature.          f) The locked rotor withstand time under hot condition at rated voltage shall be at least 2.5 seconds more than the starting time.          g) Starting torque shall be 1.3 times ( Min.) of rated torque.</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				
स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में पी. एच. ई. लि. द्वारा प्रदान की गई जानकारी को गोपनीय है। इसका प्रयोग एवं प्रसारण केवल ही एच. ई. लि. के द्वारा ही किया जा सकता है। अन्यथा इसका प्रयोग करने से किसी भी तरह का नुकसान हो सकता है।				
दिनांक SIGN & DATE 13/6/03				
संपूर्ण सूची संख्या INVENTORY NO. P-5498	REV. NO. 03		निर्माणकर्ता WORKED BY Vinod Kumar	 24.5.03
			जांचकर्ता CHECKED BY K.B.Batra	 24.5.03

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक  <b>PRODUCT STANDARD</b> ( STEAM TURBINE ENGINEERING )		<b>ST- 39011</b>	
				पृष्ठ 3 का 9 Page 3 of 9	
सुपरसेड इन्वेंटरी सामग्री सूची संख्या को अधिकतम अंक 5	<p><b>4.9 RUNNING CONDITIONS:</b></p> <p>a) Motor shall be capable to run at 80% of rated voltage for at least 5 minutes and at 70% of rated voltage for at least 1 second.</p> <p>b) Break down torque shall be two times ( Min.) of rated torque.</p> <p>c) Power factor at full load shall be 0.85 (Min.)</p> <p><b>4.10 EFFICIENCY AT FULL LOAD:</b> As per IS 8789</p> <p><b>4.11 INSULATION :</b> Class B, Tropicalized fungus resistant as per IS:3202.</p> <p><b>4.12 ENCLOSURE:</b> Totally enclosed fan cooled (TEFC), IP 55 . IS: 4691</p> <p><b>4.13 GROUNDING:</b> One no. grounding terminal shall be provided on each side of the motor frame for grounding.</p> <p><b>4.14 TERMINAL BOX:</b> This shall be provided with double compression cable gland and cable lugs for the cable sizes which will be informed during order execution. Fault level shall be 50 KA for 0.25 Sec.</p> <p><b>4.15 LUBRICATION:</b> The motor shall be re-woundable type and shall have on line greasing facility. Alternatively , it may be provided with pre-lubricated sealed type bearings.</p> <p><b>4.16 TESTS:</b></p> <p>The motor shall be subject to type and routine tests as per IS : 4722. Three copies of test certificates shall be dispatched along with the motor.</p> <p>In addition to above the following test shall also be carried out :-</p> <ol style="list-style-type: none"> <li>1.) Degree of protection test as additional type test,</li> <li>2.) 20% over-speed test for 2 minutes as routine test,</li> <li>3.) Measurement of vibration level as routine test as per IS12075.</li> <li>4.) Measurement of noise level as routine test as per IS12065.Noise level shall meet the requirement of Pump-motor set.</li> </ol>				
COPYRIGHT AND CONFIDENTIAL The information on this document 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					
स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं आशय इस से किसी भी तरह प्रयोग, जो कि कंपनी के हित में अधिकार को न किया जाए।					
दिनांक SIGN & DATE	13.6.03				
सामग्री सूची संख्या INVENTORY NO. P-5498	REV. NO. '03'		निर्माणकर्ता WORKED BY Vinod Kumar		7/4/06
			जांचकर्ता CHECKED BY K.B.Batra		7/4/06


दस्तावेज एवं तिथि SIGN & DATE		उत्पाद मानक <b>PRODUCT STANDARD</b> ( STEAM TURBINE ENGINEERING )		<b>ST- 39011</b>									
				पृष्ठ 4 का 9 Page 4 of 9									
समीचीन सूची संख्या को अधिकतम करता है	SUPERSEDES INVENTORY	<p><b>5.0 DOCUMENTS:</b></p> <p>(I) Two copies of the following information shall be furnished along with the offer :</p> <p>(a) Drawing showing all terminals and location and dimension of terminal boxes.</p> <p>(b) Brief motor data .</p> <p>(II) Four hard copies and a soft copy of the following information shall be furnished within four weeks after placement of order :</p> <p>(a) Motor G.A.drawing,</p> <p>(b) Electrical connection diagrams,</p> <p>(c) Motor data sheets.</p> <p>(d) Characteristic curves of motor.</p>											
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this document is the property of Bharat Heavy Electrical Limited and shall not be used in any way detrimental to the interest of the company													
<b>स्वत्वाधिकार एवं गोपनीय</b> इस दस्तावेज में दी गई सूचना भारत भारती इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं आगमन केवल उस व्यक्ति की संज्ञा से ही होना चाहिए जो कि कंपनी के द्वारा यह अधिकारण को न किया जाए ।													
दस्तावेज एवं तिथि SIGN & DATE	13.6.03												
समीचीन सूची संख्या INVENTORY NO. <b>P-5498</b>	REV. NO. '03'	<table border="1"> <tr> <td>निर्माणकर्ता WORKED BY</td> <td>Vinod Kumar</td> <td></td> <td>07/4/06</td> </tr> <tr> <td>जांचकर्ता CHECKED BY</td> <td>K.B.Batra</td> <td></td> <td>7/4/06</td> </tr> </table>				निर्माणकर्ता WORKED BY	Vinod Kumar		07/4/06	जांचकर्ता CHECKED BY	K.B.Batra		7/4/06
निर्माणकर्ता WORKED BY	Vinod Kumar		07/4/06										
जांचकर्ता CHECKED BY	K.B.Batra		7/4/06										


<b>INVENTORY No.</b> P-542		<b>SIGN &amp; DATE</b> 14.12.85	<b>INVENTORY No.</b> 14.12.85	<b>SUPERSEDES</b> INVENTORY No.	<b>SIGN &amp; DATE</b>		<b>PRODUCT STANDARD</b>		FORM
							<b>STEAM TURBINE ENGINEERING</b>		ST 39011 PAGE 5 OF 9
<p><b>5.0 FUNCTIONAL DESIGN, CALCULATION AND MECHANICAL DESIGN:</b></p> <p>Generally accepted engineering practice shall be applied and taken into account in the functional design, calculation, mechanical design and testing of pumps. The codes and standards applied in each case shall be mentioned in the preapproval documents.</p> <p><b>6.0 MATERIAL :-</b></p> <p>All material used in the construction of pump shall be selected from the range of material most appropriately suitable for the purpose &amp; service conditions. The bidder shall furnish alongwith the bid the material specification for all the components to BHEL for their review &amp; acceptance by BHEL/Owner. BHEL/Owner reserves the right to ask for changes in material.</p> <p><b>7.0 PREAPPROVAL DOCUMENTS AT THE TIME OF OFFER</b></p> <p>Five sets of the preapproval documents shall be submitted. They shall comprise:-</p> <ol style="list-style-type: none"> <li>1) Assembly drawing with parts list with details of certification to DIN 50049.</li> <li>2) Characteristics curves:-             <ol style="list-style-type: none"> <li>a) Discharge Vs Head</li> <li>b) Discharge Vs efficiency</li> <li>c) Discharge Vs power</li> <li>d) Speed Vs Torque</li> </ol> </li> <li>3) Quality Plan.</li> </ol> <p><b>8.0 DOCUMENTS TO BE SUPPLIED AFTER THE PLACEMENT OF ORDER</b></p> <p>These shall be supplied in 10 copies and one reproducible each:</p>									
REV. NO. 03									

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.

SIGN & DATE		PRODUCT STANDARD		FORM
SIGN & DATE		STEAM TURBINE ENGINEERING		ST 39011
SUPERSEDES INVENTORY No.				PAGE 6 OF 9
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.		8.1	Contractual drawings	8 weeks
		8.2	Overhaul and spare parts lists	8 weeks
		8.3	Equipment description	8 weeks
		8.4	Operating, cleaning and maintenance & instructions.	12 weeks
		8.5	Assembling and disassembling instructions -	12 weeks
		8.6	List of tool and tackles	8 weeks
		8.7	Instruction on conservation and deconservation	12 weeks
				<u>TEST CERTIFICATES</u>
		9.0	Material test certificates & performance test certificate giving the actual values obtained & records corresponding to the test/inspections/examinations listed in the pre-approval documents and properly correlated with the actual supply shall be furnished to BHHL.	
		10.0	<u>NAME PLATE IDENTIFICATION MARKINGS SHOULD BE AS FOLLOWS:</u>	
		10.1	Type/Designation	
		10.2	Manufacturer	
		10.3	Manufacturer's works No.	
		10.4	Year of manufacturing	
		10.5	Purchaser's order No.	
		10.6	Volumetric flow (L/m)	
		10.7	Discharge pressure at rated flow (Bar/MWC)	
		10.8	Operating temperature (°C)	
		10.9	Flow medium	
		10.10	Speed.	
		11.0	<u>CLEANING AND SURFACE PROTECTION</u>	
		The surfaces shall be rubbed with a solvent (white spirit) to clean and prepare them for the application of the paints. Unmachined surfaces shall be blast-cleaned with non-silicotic abrasive agents (grain size $\angle 1.2$ mm) to remove any rust.		
INVENTORY No.		REV. NO.		
P-5498		03		

SIGN & DATE		SUPERSEDES INVENTORY No.		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.		SIGN & DATE		INVENTORY No.	
		<b>PRODUCT STANDARD</b> <b>STEAM TURBINE ENGINEERING</b>				<b>FORM</b> <b>ST 39011</b>		<b>PAGE 7 OF 9</b>	
		<p><b>Outer Protective Coating</b></p> <p>Unless otherwise specified in the Order, parts which do not come into contact with the operating medium shall be given the following coatings:</p>							
Application Sequence		Coating and Preservative materials		Brief Description of Coating and Preservative Materials		Shade		Min-Layer Thickness	
<p>Where oil and condensate are used as the operating medium:</p>									
1		Prime coat		Oil modified alkyd resins, Zinc Chromate and iron Oxide, solvent		greyish-green		20 $\mu$ m	
2		Prime coat		Oil Modified alkyd resins, Zinc Chromate and iron oxide, solvent		Reddish brown		20 $\mu$ m	
<p>Where high flash-point fluid is used as the operating medium:-</p>									
1		Prime coat		Two-component polyurethane zinc chromate prime coat tinting pigments		tinted reddish brown		20 $\mu$ m	
2		Prime coat		Two-component polyurethane zinc chromate prime coat tinting pigments		tinted greyish-green		20 $\mu$ m	
3		Feldal Hardener for items 1 & 2		Cold-cured product of a diisocyanate					
4		Thinner		Thinning to attain brushability esters/higher aromatics					
<p>Where the manufacturer is unable to satisfy the aforesaid requirements, he shall submit exact and precise details of the surface protection measures envisaged by him to HEM for approval.</p>									
INVENTORY No.		REV. NO. 03							

SIGN & DATE		SIGN & DATE		INVENTORY No.		INVENTORY No.	
				<b>PRODUCT STANDARD</b> <b>STEAM TURBINE ENGINEERING</b>		FORM	
						ST 39011 PAGE 8 OF 9	
SUPERSEDES INVENTORY No.		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.		12.0 <u>PACKING</u> <p>The parts shall be packed so that adequate protection is afforded against contamination, mechanical damage and corrosion.</p>			
13.0 <u>TRANSPORT</u> <p>The supplier shall, when requested to do so by BHEL, arrange for orderly and punctual transport to the shipping address.</p>							
14.0 <u>SPECIAL TOOLS AND TACKLES</u> <p>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>							
15.0 <u>CONSUMABLES</u> <p>Supplier shall clearly indicate the brand names of lubricant used in the bearings. (Only indigenous lubricants shall be acceptable).</p> <p>Supplier shall submit the exact details of any other consumables used in the pumping set.</p>							
16.0 <u>GUARANTEE</u> 16.1 The supplier shall guarantee trouble free and satisfactory operation of the equipment for a period of 18 months after the installation and commissioning or for a period of 36 months from the day the equipment leaves the supplier's works, whichever is earlier. 16.2 The supplier shall guarantee the capacity, head and efficiency of the pump as per the tested characteristics with operating medium. 16.3 If during erection at site any deficiency in apart is detected, BHEL site representative shall prepare the assessment report and a copy of the same shall be forwarded to the supplier. The supplier shall replace /rectify the concerned items free of the charge. The supplier if he so desire may depute his representatives to site at his own art otherwise the finding of BHEL representative shall be final and binding on the supplier of pumping set. 16.4 The supplier shall repair/replace the defective parts at his own cost during the guarantee period.							
17.0 <u>ERECTION</u> <p>The contractor shall assure proper erection of the pump and all individual parts bearing in mind ISO fitting, tolerances and recommendations.</p>							
REV. NO. 03							



SIGN & DATE	SIGN & DATE		PRODUCT STANDARD	ST 39011
			STEAM TURBINE ENGINEERING	PAGE 9 OF 9
SUPERSEDES INVENTORY No.			18.0 <u>SPARES</u>	
			The supplier shall quote itemwise price of recommended spares for 3 years and 5 years operation respectively.	
			19.0 <u>QUALITY PLAN</u>	
			<p>The supplier shall furnish a quality plan on BHEL's format detailing all the checks/tests conducted by supplier at various stages/ We shall also furnish three copies of all in-house test procedures &amp; acceptance norms along with quality plan. Any specific requirement from our customers shall be included in the plan while placing the order. BHEL / BHEL's customer shall identify customer hold points in this quality plan beyond which work shall not proceed without the approval of BHEL. The quality plan will form a pre-approval document.</p>	
			<p>① / including performance test.</p>	
			<p>20.0 Cross refered standards:-</p>	
			<p>② { DIN 6774, DIN 19052, DIN 19055, EN 10204 &amp; VDMA 24284</p>	
			<p>IS: 325, IS: 2253, IS: 1271, IS: 12065, IS: 12075, IS: 4722 AND</p>	
			<p>IS: 3202, IS: 4691.</p>	
INVENTORY No.	SIGN & DATE			
P-5498				
			REV. NO.	
			03	

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.