



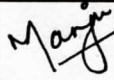






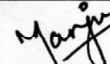




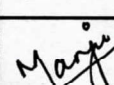
दिनांक एवं हस्ताक्षर SIGN & DATE		<h2 style="margin: 0;">उत्पाद क्रय विनिर्देश</h2> <h3 style="margin: 0;">PRODUCT PURCHASE SPECIFICATION</h3>	TG60432 पृष्ठ 8 का 1 Page 1 of 8																								
SUPERSEDES INVENTORY NO.		Based on BHEL's own experience																									
COPYRIGHT AND CONFIDENTIAL 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.		<h3 style="margin: 0;">VAPOUR EXHAUSTER</h3>																									
स्वत्वाधिकार एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत भारती लिमिटेड का संपत्ति है। इसका प्रयोग अन्य उद्देश्य के लिए बिना लिखित अनुमति के नहीं किया जा सकता है।		<p>1.0 SCOPE AND APPLICATION: This specification intended to cover design, manufacture, assembly testing & delivery of vapour exhauster, complete with motor, coupling, base plate and other accessories. The vapour exhauster is required to handle mixture of turbine oil vapours, air & H₂ and for creating partial vacuum in generator bearing chamber & oil tanks of Turbo-generators.</p> <p>2.0 DESIGNATION: The Vapour exhauster shall be designated as below: -</p> <p>2.1 ON DRAWINGS INDENTS:</p> <table style="width: 100%;"> <tr> <td>(1) Material specification column</td> <td>:</td> <td>TG-60432</td> </tr> <tr> <td>(2) Description Column</td> <td>:</td> <td>Vapour Exhauster</td> </tr> <tr> <td>(3) Material Code Column</td> <td>:</td> <td>W 96415000578</td> </tr> </table> <p>2.2 ON ENQUIRES AND PURCHASE ORDER:- In addition to incorporating the above details, a copy of the standard shall be enclosed along with enquiry.</p> <p>3.0 TECHNICAL REQUIREMENTS:</p> <p>3.1 TECHINCAL DATA OF VAPOUR EXHAUSTER:</p> <table style="width: 100%;"> <tr> <td>(1) Continuous discharge capacity at operating point</td> <td>:</td> <td>396 m³ / hr</td> </tr> <tr> <td>(2) Normal discharge pressure at operating point</td> <td>:</td> <td>96 mmWC</td> </tr> <tr> <td>(3) Operating temp. of the medium</td> <td>:</td> <td>70°C</td> </tr> <tr> <td>(4) Ambient temp.</td> <td>:</td> <td>50°C</td> </tr> <tr> <td>(5) Speed</td> <td>:</td> <td>2820rpm</td> </tr> </table>		(1) Material specification column	:	TG-60432	(2) Description Column	:	Vapour Exhauster	(3) Material Code Column	:	W 96415000578	(1) Continuous discharge capacity at operating point	:	396 m ³ / hr	(2) Normal discharge pressure at operating point	:	96 mmWC	(3) Operating temp. of the medium	:	70°C	(4) Ambient temp.	:	50°C	(5) Speed	:	2820rpm
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TSX		अनुवादक TRANSLATED BY																									
PSC Member		निर्माणकर्ता WORKED BY																									
QAX		जांचकर्ता CHECKED BY																									
महुमन विभाग AGREED DEPTT.		पर्यवेक्षणकर्ता SUPERVISED BY																									
नाम NAME		R. L. VYAS																									
दिनांक एवं हस्ताक्षर DATE & SIGNATURE		स्वीकृति APPROVED : Rakesh Kumar (AGM/EME)																									
SUPERSEDES		जारीकर्ता ISSUED : TSX																									
REV.NO. 04		निर्माणकर्ता PREPARED : EME																									
Date. 11.01.18		जारीकर्ता ISSUED : TSX																									
CHANGE ADVICE NO. TGE-18- 02		दिनांक DATE : 09.09.92																									



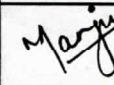
SIGN & DATE SUPERSEDES INVENTORY भारतीय सूची संख्या अतिरिक्त नंबर है		उत्पाद क्रय विनिर्देश PRODUCT PURCHASE SPECIFICATION		TG60432 पृष्ठ 8 का 2 Page 2 of 8	
		3.2 DESIGN AND CONSTRUCTION OF VAPOUR EXHAUSTER			
<p>3.2.1 The material of the exhauster shall be such as to resist corrosion and shall give long trouble free service.</p> <p>3.2.2 The design shall be such as to keep the friction and wear minimum caused by end thrust. Wear in mechanical seals bearings shall be minimum. The rotor of the exhauster shall be dynamically balanced as per ISO 1940, so that vibration of the exhauster is not greater than 25 micron peak to peak as per IEC 60034-14. The noise level shall not be greater than 85dB when measured at a distance of 1 meter from the base of the equipment, measurement should be done as per IEC 60034-9.</p> <p>3.2.3 Seals must comply with the following: - (a) Easy access for maintenance work. (b) No contamination of the medium from materials abraded from the seals. (c) No seepage of lubricants into the flow medium. (d) No leakage of gases outside in the atmosphere (e) No seepage of oil toward, motor and outside along with the shaft. (f) Shaft shall be sealed with grease lubricated axial seal as shown in the figure.</p> <p>3.2.4 Exhauster bearing shall be designed so as to ensure 50000 hours of continuous service.</p> <p>3.2.5 The exhauster shall be provided with a drain plug.</p> <p>3.2.6 Fan impeller is to be directly mounted onto rotor shaft as shown in the figure at page 8.</p> <p>3.2.7 The critical speed of the exhauster shall not lie within $\pm 30\%$ of the operating speed (2820 rpm) of the exhauster.</p> <p>3.2.8 Minimum clearance between impeller & casing shall be 2mm to ensure that there is no rubbing.</p> <p>3.2.9 The construction, mounting and base frame dimensions shall be generally as per figure at page 8.</p> <p>3.2.10 Materials of Construction:- (1) Casing : Carbon Steel as per IS:2062 E250 BR (2) Impeller : Carbon Steel as per IS:2062 E250 BR (3) Base Frame : Carbon Steel as per IS:2062 E250 BR (4) Sleeve : Brass (5) 'O' ring : Neoprene</p>					
<p>3.3 MOTOR SPECIFICATIONS</p> <p>3.3.1 TYPE : TEFC squirrel cage induction motor to IEC 60034-1</p> <p>3.3.2 KW rating : 0.75kW</p> <p>3.3.3 Rated voltage : 415 Volts, 3 phase, 50Hz</p> <p>3.3.4 Type of duty : S1 (Continuous) as per IEC 60034-1</p> <p>3.3.5 Efficiency class : Refer Variant Table as below</p>					
भारतीय सूची संख्या INVENTORY NO. P-5094	REV. NO. 04	निर्माणकर्ता WORKED BY Kunal Mishra	जांचकर्ता CHECKED BY Manju Azad	11/01/18	11/01/18

SIGN & DATE म. भारती		उत्पाद क्रय विनिर्देश PRODUCT PURCHASE SPECIFICATION		TG60432										
				पृष्ठ 8 का 3 Page 3 of 8										
SUPERSEDES INVENTORY मासकी सूची में मंजूरी अधिलेखित करना है	<table border="1"> <thead> <tr> <th>MATERIAL CODE OF VAPOUR EXHAUSTER ASSEMBLY</th> <th>EFFICIENCY CLASS OF MOTOR AS PER IEC- 60034-30</th> <th>STARTING CURRENT (IN % OF FULL LOAD CURRENT) + 20% (Tolerance as per IEC: 60034-1)</th> </tr> </thead> <tbody> <tr> <td>W96415000578</td> <td>IE-2</td> <td>650</td> </tr> <tr> <td>W96415003127</td> <td>IE-3</td> <td>700</td> </tr> </tbody> </table>					MATERIAL CODE OF VAPOUR EXHAUSTER ASSEMBLY	EFFICIENCY CLASS OF MOTOR AS PER IEC- 60034-30	STARTING CURRENT (IN % OF FULL LOAD CURRENT) + 20% (Tolerance as per IEC: 60034-1)	W96415000578	IE-2	650	W96415003127	IE-3	700
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W96415003127	IE-3	700												
<p>3.3.6 Permissible voltage variation : $\pm 10\%$</p> <p>3.3.7 Permissible Frequency variation : $\pm 5\%$</p> <p>3.3.8 Combined voltage & frequency variation : $+ 10\%$</p> <p>3.3.9 Min. voltage required under starting : 85%</p> <p>3.3.10 Conditions to bring driven equipment to rated speed</p> <p>3.3.11 Starting Torque : Min. 1.3 times the rated torque.</p> <p>3.3.12 Breakdown torque : Min. 2 times the rated torque.</p> <p>3.3.13 Starting : DOL</p> <p>3.3.14 Acceleration time with full load connected: $3.5 + 0.5$ sec.</p> <p>3.3.15 Starting duty : 3 starts spread over on hour and 2 consecutive starts from hot</p> <p>3.3.16 Condition without injurious heating to the winding.</p> <p>3.3.17 Overload capacity : Motor shall be capable of running at full load with 80% of rated</p> <p>3.3.18 Voltage for 10min. and 70% of rated voltage for 1 min.</p> <p>3.3.19 Class of insulation : 'F' with temperature limited to Class B (70°C)</p> <p>3.3.20 Ventilation : Totally enclosed & fan cooled</p> <p>3.3.21 Enclosure protection : IP 55 as per IEC 60034-5</p> <p>3.3.22 Explosion proof : Group II T4 as per IEC 60079</p> <p>3.3.23 Bearing : as per suppliers design. Life not less than 50000hrs.</p> <p>3.3.24 Earthing : Suitable arrangement to be provided at 2 places.</p> <p>3.3.25 Terminal box : Terminal box shall be explosion proof as per Group II T4 IEC 60079.</p> <p>3.3.26 Cable gland also to be provided in terminal box for 3 core Aluminium cable.</p> <p>3.3.27 Fault level : 50 KA for 1 sec.</p> <p>4.0 PUMP DATA SHEET (TO BE FURNISHED ALONGWITH OFFER :</p> <p>4.1 Capacity M3 / Sec. :</p> <p>4.2 Head MWC :</p> <p>4.3 Efficiency :</p> <p>4.4 Rated speed :</p> <p>4.5 Exhauster B.H.P. / kw at Rated Capacity :</p> <p>4.6 Material: Casing Impeller base Frame 'o' ring :</p> <p>4.7 Type of bearing used :</p> <p>4.8 Type of coupling :</p> <p>4.9 Type of Sealing :</p> <p>4.10 Suction size :</p> <p>4.11 Discharging size :</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 प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है। इसका प्रयोग एवं प्रसारण केवल उसी उद्देश्य के लिए ही किया जा सकता है जो कि कम्पनी के हित में है। बिना अनुमति के इस सूचना का प्रयोग अन्य किसी उद्देश्य के लिए नहीं किया जा सकता।													
दिनांक एवं हस्ताक्षर SIGN & DATE 	REV. NO. 04													
मासकी सूची संख्या INVENTORY NO. P-5894	निर्माणकर्ता WORKED BY Kunal Mishra				11/01/18									
	जांचकर्ता CHECKED BY Manju Azad				11/01/18									

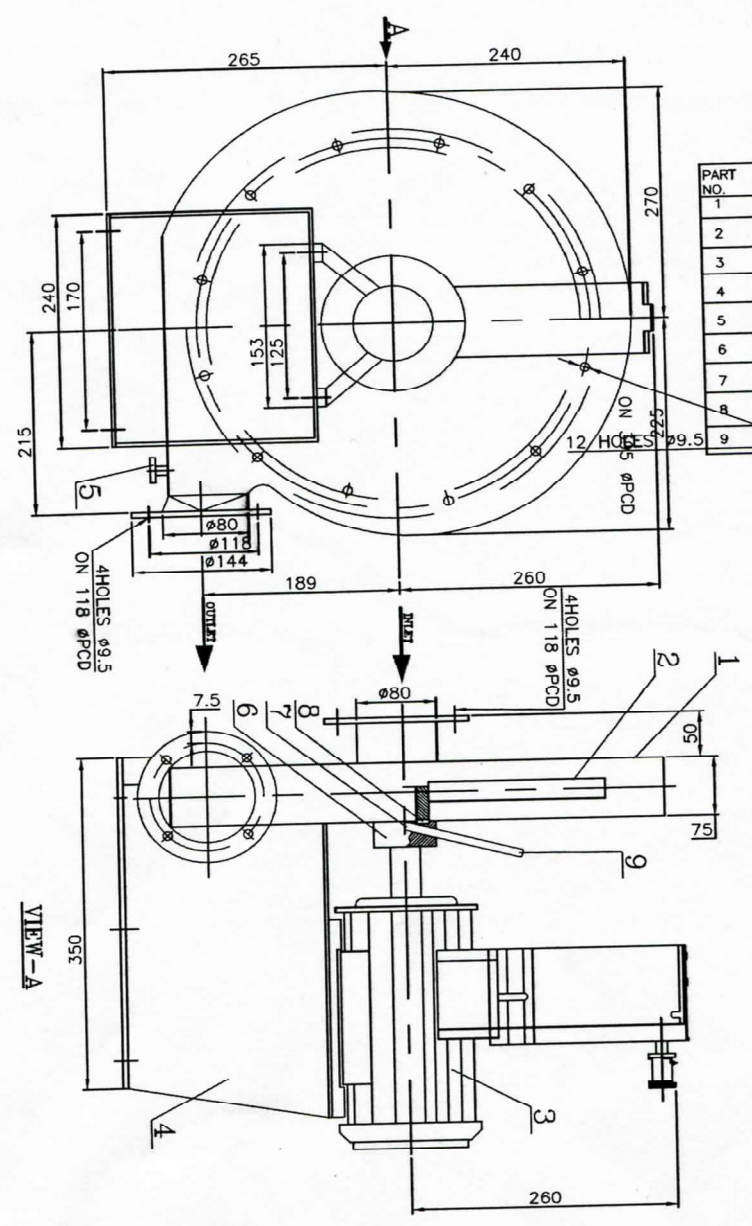
नं. हस्ताक्षर SIGN & DATE		उत्पाद क्रय विनिर्देश PRODUCT PURCHASE SPECIFICATION		TG60432	
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SUPERSEDES INVENTORY	मासकी सूची संख्या को संश्लेषित करना है	4.12 Wt. of exhaustor with motors base frame 4.13 Wt. of exhaustor 4.14 General assy. & cross sectionals drawing enclosed with offer 4.15 Capacity Vs discharge pressure curve enclosed 4.16 Power consumption Vs discharge pressure curve enclosed 4.17 Capacity Vs efficiency curve enclosed			
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.		5.0 MOTOR DATA SHEET (TO BE FURNISHED ALONG WITH OFFER)			
		5.1 Manufacturer 5.2 Type 5.3 Frame size 5.4 Power absorbed by exhaustor at duty point (kW) 5.5 Rated power (kW) 5.6 Duty cycle 5.7 Rated voltage 5.8 No. of phase 5.9 Frequency 5.10 Allowable voltage variation 5.11 Allowable frequency variation 5.12 Allowable voltage & frequency variation 5.13 Current 5.14 Rated speed (RPM) 5.15 Full load efficiency 5.16 Full load power factor 5.17 Method of starting 5.18 Max. starting current 5.19 Class of insulation 5.20 Starting torque 5.21 Max. torque 5.22 Safe stall time a. Under hot condition b. Under cold condition 5.23 Type of enclosure 5.24 Enclosure protection 5.25 Frequency of starting 5.26 Temp. rise above 500C 5.27 By resistance method By thermometer method 5.28 Type & no. of terminals brought out 5.29 Type of connection during continuous running 5.30 Type and size of cable for when gland is provided in the terminal box. 5.31 Guaranteed min. voltage read at non terminals 5.32 System of earthing			
स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई प्रतियां भारत हेवी एलेक्ट्रिकल लिमिटेड की संपत्ति हैं। इसका प्रयोग एवं प्रसारण बिना लिखित अनुमति के कहीं भी नहीं किया जा सकता है।	दिनांक एवं हस्ताक्षर SIGN & DATE 	REV. NO. 04	निर्माणकर्ता WORKED BY Kunal Mishra		11/01/18
मासकी सूची संख्या INVENTORY NO. P5894			जांचकर्ता CHECKED BY Manju Azad		11/01/18

ब्रह्म SIGN & DATE		उत्पाद क्रय विनिर्देश PRODUCT PURCHASE SPECIFICATION		TG60432	
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SUPERSEDES INVENTORY सामग्री सूची संख्या से अपडेट किया गया है	5.33 Relevant standard : 5.34 Motor GD2 Valve : 5.35 Type of bearings (DE) : 5.36 Type of bearings (NDE) : 5.37 Type of lubricant : 5.38 Frequency of lubrication : 5.39 Wt. of motor : 5.40 Insulation class :				
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		6.0 QUALITY ASSURANCE, INSPECTION AND TESTING. 6.1 The manufacture shall conduct all tests required to ensure that the exhauster conforms to the requirements of application codes and standards. 6.2 The bidder shall submit the particulars of proposed shop tests along with procedures for information. 6.3 The equipment shall be dispatched only after inspection and clearance by BHEL / owner. 6.4 The min. tests checks to be carried out on vapour exhauster, as envisaged by BHEL are given below:- 6.4.1 The material of Casing, Impeller, Base frame, Sleeve & O Ring shall be tested as per relevant standard for the chemical composition and mechanical properties. 6.4.2 TESTS DURING VARIOUS STAGE OF MANUFACTURING 1) Check for dimension and finish of the components. 2) D.P.T on all welding as per ASME section VIII. 3) Dynamic balancing of impeller as per ISO 1940 Gr. 6.3. 6.4.3 FINAL TESTS: - Following tests shall be carried out:- 1) Flow rate of air 2) Vibration test as per IEC 60034-14. 3) Noise : shall not be greater than 85dB when measured at a distance of 1 meter from the base of the equipment, measurement should be done as per IEC 60034-9 4) Speed 5) Dimensional check 6) Smooth running 7) Performance test as per ISO:5801 6.4.4 Type & Routine tests on motor as per IEC:60034-1 6.4.5 Vendor to furnish the test certificates for the following 1) Motor Enclosure certificate as per IP 55 as per IEC 60034-5 2) Explosion proof certificate for motor for Group II T4 as per IEC60079 3) Certificate for enclosure of Terminal box for explosion proof as per Group II T4 IEC 60079. 4) Certificate for minimum clearance of 2mm between impeller & casing.			
स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है, इसका प्रयोग एवं प्रसारण के बिना या इसकी शर्तों के बिना नहीं किया जा सकता है।	11/01/18				
निष्काशक SIGN & DATE	11/01/18				
सामग्री सूची संख्या INVENTORY NO.	REV. NO. 04	निर्माणकर्ता WORKED BY	Kunal Mishra		11/01/18
11/01/18		जांचकर्ता CHECKED BY	Manju Azad		11/01/18

नमूना संख्या SIGN & DATE		उत्पाद क्रय विनिर्देश PRODUCT PURCHASE SPECIFICATION		TG60432	
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सुपरसेड INVENTORY	माली सूची संख्या को अपडेट किया गया है	<p>6.4.6 After testing the exhauster, all the surface and internal shall be thoroughly cleaned, dried and conserved. All the metallic surface except bright parts exposed to weather shall be given suitable primary coating.</p> <p>7.0 DOCUMENTS TO BE FURNISHED AT THE TIME OF OFFER</p> <p>7.1 Assembly drawings part list, nozzle size, their coordinates base plate details etc.</p> <p>7.2 Technical data sheet of pump as per clause 4.</p> <p>7.3 Technical data sheet of motor as per clause 5.</p> <p>7.4 Performance curves.</p> <p>7.5 Quality plan in BHEL format, incorporating checks/tests at material stages, in process & final testing.</p> <p>7.6 Clause wise confirmations of specification TG60432.</p> <p>8.0 DOCUMENT TO BE SUPPLIED</p> <p>8.1 AFTER PLACEMENT OF ORDER</p> <p>8.1.1 G.A. drawing with parts list & material details.</p> <p>8.1.2 Final quality plan.</p> <p>8.2 DOCUMENT FOR FINAL SUBMISSION</p> <p>8.2.1 Performance curves.</p> <p>8.2.2 Test certificates for all test checks in clause 6.4 shall be furnished.</p> <p>9.0 CLEANING, PAINTING, CONSERVATION AND PACKING</p> <p>The surface shall be cleaned and prepared for application of paint by shot blasting. The protective coating should be oil resistant. After testing the exhauster, its internals shall be thoroughly cleaned, dried and conserved before packing. The exhauster packing shall be strong enough to safeguard against any damage during transit. The exhauster shall be packed such that it is safe for at least 2 year of storage in damp atmosphere.</p> <p>10.0 GUARANTEE</p> <p>10.1 The supplier shall guarantee trouble free and satisfactory operation of the equipment for a period of 12 months after commissioning at site or 18 months from the date of dispatch, whichever is earlier.</p> <p>10.2 The supplier shall guarantee the tested capacity head and capacity of the exhauster.</p> <p>10.3 The supplier shall repair /replace the defective parts at his own cost during the guarantee period.</p>			
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माली सूची संख्या INVENTORY NO.	दिनांक एवं हस्ताक्षर SIGN & DATE	निर्माणकर्ता WORKED BY Kunal Mishra			
25894		जांचकर्ता CHECKED BY Manju Azad			
REV. NO. 04		11/01/18			

SIGN & DATE 11/01/18		उत्पाद क्रय विनिर्देश PRODUCT PURCHASE SPECIFICATION		TG60432	
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SUPERSEDES INVENTORY सामग्री सूची संख्या को अधिकृत करता है	<p>11.0 IDENTIFICATION</p> <p>A name plate of stainless steel with following information engraved on it, shall be affixed to the equipment at appropriate location –</p> <ul style="list-style-type: none"> - Item description - Manufacturer's name - Year of manufacturing - Sl. No. - Main technical parameters i.e. Flow rate, Discharge pressure, Speed, Flow Medium, operating temperature, Motor KW Rating. - BHEL specification no. - BHEL material code. - BHEL P.O. No. <p>12.0 GENERAL</p> <p>Bidder shall furnish all the documents as per clause 7 of the specification along with offer. Any deviation shall be clearly spelled out. The offer may not be considered if all the technical particulars and information called for in the specification are not submitted along with the offer.</p> <p>13.0 CROSS REFERRED STANDARD</p> <p>ISO 1940, ISO 5801 IEC 60034-14, IEC 60034-9, IEC 60034-1, IEC 60034-5, IEC 60079 IS:2062</p>				
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निमांक एवं दिनांक SIGN & DATE 11/01/18	REV. NO. 04				
सामग्री सूची संख्या INVENTORY NO. P-5894	निर्माणकर्ता WORKED BY Kunal Mishra		 11/01/18		
	जांचकर्ता CHECKED BY Manju Azad		 11/01/18		

ब. हस्ताक्षर SIGN & DATE		TG60432	
सामग्री सूची संख्या INVENTORY NO.		पृष्ठ 8 का 8 Page 8 of 8	
SUPERSEDES INVENTORY		उत्पाद क्रय विनिर्देश PRODUCT PURCHASE SPECIFICATION	
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दिनांक एवं हस्ताक्षर SIGN & DATE		11/01/18	
सामग्री सूची संख्या INVENTORY NO.		95896	
REV. NO. 04		निर्माणकर्ता WORKED BY Kunal Mishra	
जांचकर्ता CHECKED BY Manju Azad		11/01/18	



PART NO.	DESCRIPTION
1	CASING
2	IMPELLER
3	MOTOR
4	MOTOR SUPPORTING BRACKET
5	DRAIN PLUG
6	STUFFING BOX
7	'O' RING OIL SEAL
8	SLEEVE
9	GREASE NIPPLE