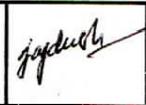
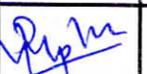


दिनांक एवं हस्ताक्षर SIGN & DATE	उत्पाद मानक		TG60688		
	PRODUCT STANDARD		पृष्ठ 6 का 1 Page 1 of 6		
ELECTRICAL MACHINE ENGINEERING		Based on EMT 638-061			
सामग्री सूची संख्या की अधिकारिता करता है SUPERSEDES INVENTORY NO.	<p align="center">VACUUM PUMP (ROTARY VANE TYPE) (for 660/700/800 MW Turbo Generator)</p>				
समग्री सूची संख्या की अधिकारिता 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	<p>1.0 SCOPE: This standard specifies the requirement of rotary vane type, vacuum pump motor for H₂ cooled Generator involving single flow ring type seal, for evacuating air, and H₂ & oil vapour mixture from seal oil tank.</p>				
	<p>2.0 APPLICATION STANDARD This specification is Based on EMT 638-061.</p>				
	<p>3.0 DESIGNATION: A Rotary vane type Vacuum Pump Motor set shall be designated as below.</p>				
	<p>3.1 ON DRAWINGS: Specification column : TG-60688 Description Column : Vacuum pump Material Code Column : W90414905636</p>				
<p>3.2 ON INDENTS: Vacuum Pump Motor set (Rotary vane type) as per product standard number.</p>					
<p>3.3 ON ENQUIRES & PURCHASE ORDER: In addition to incorporating the above information, a copy of this specification shall be enclosed.</p>					
<p>4.0 DESIGN AND CONSTRUCTION OF VACUUM:</p>					
<p>4.1 General: The vacuum pump motor set shall be suitable for tropical and humid atmosphere of ambient temperature of 0-50 °C.</p>					
<p>4.2 GENERAL DESCRIPTION: Rotary vane vacuum pump consists of a cylindrical housing stator and an eccentrically</p>					
हस्ताक्षर एवं दिनांक SIGN & DATE	नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE			
TSX	DEEPAK KR	29/10/15			
PSC Member	R. Kumar	29/10/15	अनुवादक	TRANSLATED BY	
QAX/	VIBHOTESHAH	29/10/15	निर्माणकर्ता	WORKED BY	Jagdeesh Chauhan
			जांचकर्ता	CHECKED BY	Pratibha Gupta
			पर्यवेक्षणकर्ता	SUPERVISED BY	R.L. Vyas
सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	स्वीकृति		
WORKED BY	Jagdeesh	29/10/15	APPROVED :	A K MALHOTRA AGM(EME)	Gr.No. 4.10
CHECKED BY	MAHJU	29/10/15	निर्माण	PREPARED : TGE	DATE : 12.10.2010
REV.NO. 02		REAFFIRMED	जारी	ISSUED : TSX,HEEP,HWR	
Dt		YEAR-2021			
C.A.No.	TGE-21-34	24/06/21			

दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;">उत्पाद मानक</p> <p style="text-align: center;">PRODUCT STANDARD</p> <p style="text-align: center;">ELECTRICAL MACHINE ENGINEERING</p>	<p style="text-align: right;">TG60688</p> <p>पृष्ठ 6 का 2 Page 2 of 6</p>		
सामग्री सूची संख्या को अधिकृत करना है	SUPERSEDES INVENTORY NO.	<p>Mounted slotted rotor. The slotted rotor contains vanes, which are forced apart usually with the use of spring or by centrifugal force. As the rotor spins, these vanes slide along the stator walls and there by push forward the air drawn in at the inlet side to eject it finally through the oil above the outlet discharge valve. The oil charge of the Rotary vane pump serves as lubricant and sealing medium, fills the dead space and adds to the cooling of the pump by conducting the compression heat.</p>			
<p style="text-align: center;">COPYRIGHT AND CONFIDENTIAL</p> <p>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>		<p>4.3 All materials used in the construction of the vacuum pump shall be selected from a range of material most appropriately suitable for the purpose and service condition. These materials of the vacuum pump shall also be such as to resist corrosion and shall give long trouble free service.</p> <p>4.4 The design of the vacuum pump motor set shall be such as to make the unit compact and portable i.e. all the component shall be mounted on a single bed plate. The noise level shall not be greater than 85 dBA when measured at a distance of 1 meter from the base of the equipment.</p> <p>4.5 The maximum overall dimension of the equipment shall be as per figure-1.</p> <p>4.6 Pump shall be provided with gas ballast, inlet condensate chamber and outlet exhaust recycler.</p> <p>4.7 All parts of vacuum pump shall be supplied in assembled condition and no loose part shall be acceptable.</p> <p>5.0 TECHNICAL REQUIREMENT:</p> <p>5.1 TECHINCAL DATA OF VACUUM PUMP</p> <p>5.1.1 Rated speed : 1500RPM</p> <p>5.1.2 Ambient Temperature : 50^o C</p> <p>5.1.3 Flow medium : Air/H 2 and oil vapor mixture</p> <p>5.1.4 Flow medium Temperature : 80^o C (Max.)</p> <p>5.1.5 Maximum flow : 9.72 dm³/sec (583 LPM)</p> <p>5.1.6 Final pressure without gas ballast : 15 mbar</p> <p>5.1.7 Water vapor capability : 30 mbar</p> <p>5.1.8 Vacuum Pump adjusted : -0.4 bar (600 mbar abs)</p> <p>5.1.9 4- Wire PT 100 Temp. Sensor : 2 nos.</p> <p>5.1.10 Pressure Transmitter : At Outlet Port</p> <p>5.1.11 Inlet/Outlet Port : G1 1/4"</p> <p>5.1.12 Ignition Protection : ATEX II 2/3 G IIB+H2 T4</p> <p>5.1.13 Certificate of conformity : PTB 04 ATEX 4013 X</p> <p>5.1.14 4-wire PT100 temperature sensor : At body</p>			
<p style="text-align: center;">स्वत्वाधिकार एवं गोपनीय</p> <p>इस प्रारंभ में दी गई सूचना भारत की इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रकाश एवं अपारण रूप से किसी भी तरह प्रयोग, जो कि, कंपनी के हित में हानिकारक हो न किया जाए।</p>					
हस्ताक्षर एवं दिनांक SIGN & DATE					
सामग्री सूची संख्या INVENTORY NO.	REV.NO. 02		निर्माणकर्ता WORKED BY	Jagdeesh 	29/04/15
P-6403			जांचकर्ता CHECKED BY	Pratibha 	29/04/15

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD ELECTRICAL MACHINE ENGINEERING	TG60688 पृष्ठ 6 का 3 Page 3 of 6			
सामग्री सूची संख्या को अतिरिक्तित्व करता है SUPERSEDES INVENTORY NO.	<p>Note: Reliable run-up with coupled driven machine at 0.8 times rated voltage and reliable run-up during load with rated torque at 0.75 times rated voltage must be ensure.</p> <p>5.2 TECHNICAL DATA OF MOTOR :</p> <p>5.2.1 Nominal Rating : 1.5KW</p> <p>5.2.2 Voltage : 415 v (± 10%)</p> <p>5.2.3 Frequency : 50Hz (± 5%)</p> <p>5.2.4 Rated Current : 3.25 A</p> <p>5.2.5 Synchronous Speed : 1500 rpm</p> <p>5.2.6 Insulation Class : F</p> <p>5.2.7 Protection Class : IP55</p> <p>5.2.8 Motor Enclosure : TEFC</p> <p>5.2.9 Starting Current : 5.8 times rated current.</p> <p>5.2.10 Ignition Protection : ATEX II 2/3 G IIB+H2 T4</p> <p>5.2.11 Certificate of conformity : PTB99 ATEX 1005</p> <p>5.2.12 Frame Size : FT115</p> <p>5.2.13 Type of construction : B14</p> <p>5.3 MATERIALS OF CONSTRUCTION :</p> <p>- Oil Chamber : Al/CS (IS: 2062)</p> <p>- Stator : CI</p> <p>- Rotor : CI</p> <p>- Vanes : Glass Epoxy Sheet</p> <p>- Inlet Condensate Chamber : SS304</p> <p>- Exhaust Recycler : SS304</p> <p>5.4 ACCESSORIES (Fitted On Vacuum Pump)</p> <p>i) Inlet condensate Chamber with drain cock (Separator/ catch pot) : 1No.</p> <p>ii) Outlet exhaust recycler with oil return pipe and drain cock (if applicable) : 1No.</p> <p>iii) Small flange with sockets for inlet & outlet connection : 2No.</p> <p>iv) Clamping ring : 4nos.</p> <p>v) Centering ring nickel plated with perbunan gasket : 3nos.</p> <p>vi) Centering ring with filter (with bore hole 02mm) : 1nos.</p> <p>vii) Elbow (if applicable) : 2nos.</p> <p>viii) RTD at inlet : 1No.</p> <p>ix) RTD at body : 1No.</p> <p>x) Pressure transmitter at outlet port : 1No.</p>					
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स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कानूनी को हित में हानिकारक हो न किया जाए।						
दिनांक एवं हस्ताक्षर SIGN & DATE 						
सामग्री सूची संख्या INVENTORY P-6403	REV.NO. 02		निर्माणकर्ता WORKED BY Jagdeesh		29/04/15	
			जांचकर्ता CHECKED BY Pratibha		29/04/15	



उत्पाद मानक

TG60688

पृष्ठ 6 का 4

PRODUCT STANDARD
ELECTRICAL MACHINE ENGINEERING

Page 4 of 6

6.0 QUALITY ASSURANCE, INSPECTION AND TESTING :

6.1 The manufacture shall conduct all tests required to ensure that the equipment conforms to the requirements of applicable codes and standards. The bidder shall submit the quality plan along with offer including the procedures for performance test.

6.2 The minimum tests/checks to be carried out on Vacuum Pump as envisaged by BHEL are given below:

6.2.1 Performance tests of the pump. (check flow as per clause 5.1.3, vacuum as per clause 5.1.8 & noise level as per clause 4.4).

6.2.2 Routine test of the motor (As per IS: 325)

6.2.3 The material of each important compositions as per clause 5.3 shall be tested as per relevant standards as agreed for its chemical composition and mechanical properties.

6.2.4 Check for condition of oil seals and seepage through seals. No leakage is allowed.

6.2.5 Casing, inlet condensate chamber & exhaust recycler shall be checked for leak proofness at an air pressure of 2 bar.

6.2.6 Check for proper functioning of float in exhaust recycler.

7.0 DOCUMENTS TO BE FURNISHED ALONGWITH OFFER (IN TWO COPIES EACH)

7.1 Complete assembly drawing with various dimensions, Bill of material of each part, mounting detail, testing details etc.

7.2 Pump catalogue.

7.3 Detailed quality plan incorporating tests/ checks at materials stage, in process and final parts.

7.4 List of spare parts for 2 year normal operation.

7.5 Cleaning, painting and conservation procedure.

7.6 Performance testing procedure for vacuum Pump.

8.0 DOCUMENTS TO BE SUPPLIED AFTER ORDER PLACEMENT:**8.1 Documents for approval**

8.1.1 Complete assembly drawing having dimensional details, bill of material of each part, mounting details etc.

8.1.2 Final quality plan.

दिनांक एवं हस्ताक्षर
SIGN & DATESUPERSEDES
INVENTORY NO.सामग्री सूची संख्या को
अधिकारित करता है

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स्वत्वाधिकार एवं गोपनीय

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 & DATEसामग्री सूची संख्या
INVENTORY

REV.NO.

02

निर्माणकर्ता
WORKED BY

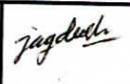
Jagdeesh

जांचकर्ता
CHECKED BY

Pratibha

29/04/15

29/04/15

दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;">उत्पाद मानक</p> <p style="text-align: center;">PRODUCT STANDARD</p> <p style="text-align: center;">ELECTRICAL MACHINE ENGINEERING</p>	<p style="text-align: right;">TG60688</p> <p style="text-align: right;">पृष्ठ 6 का 5</p> <p style="text-align: right;">Page 5 of 6</p>	
सामग्री सूची संख्या को अधिष्ठित करता है	SUPERSEDES INVENTORY NO.	<p>8.2 Documents for final submission</p> <p>8.2.1 Four copies of test certificates as per approved Quality plan.</p> <p>8.2.2 2 copies of O & M manual.</p> <p>9.0 GUARANTEE</p> <p>9.1 The supplier shall guarantee trouble free and satisfactory operation of the equipment for a period of 12 month after commissioning at site or 24 month from the date of dispatch whichever is earlier.</p> <p>9.2 The supplier shall guarantee the rated capacity (flow rate & final pressure) of the equipment.</p> <p>9.3 The supplier shall repair I replace the defective parts at his own cost during the guarantee period.</p> <p>10.0 CROSS REFERRED DOCUMENTS</p> <ul style="list-style-type: none"> - IS: 325 - IS: 2062 - IS: 304 <p>11.0 BASED ON</p> <p>Siemens EMT 638-061</p>		
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स्वत्वाधिकार एवं गोपनीय	इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रकाश एवं अप्रकाश रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।			
हस्ताक्षर एवं दिनांक SIGN & DATE				
सामग्री सूची संख्या INVENTORY	REV.NO. 02	निर्माणकर्ता WORKED BY	Jagdeesh 	29/04/15
P-6403		जांचकर्ता CHECKED BY	Pratibha 	29/04/15

सामग्री सूची संख्या को अधिकांकित करना है
 SUPERSEDES INVENTORY NO

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हस्ताक्षर एवं दिनांक
SIGN & DATE

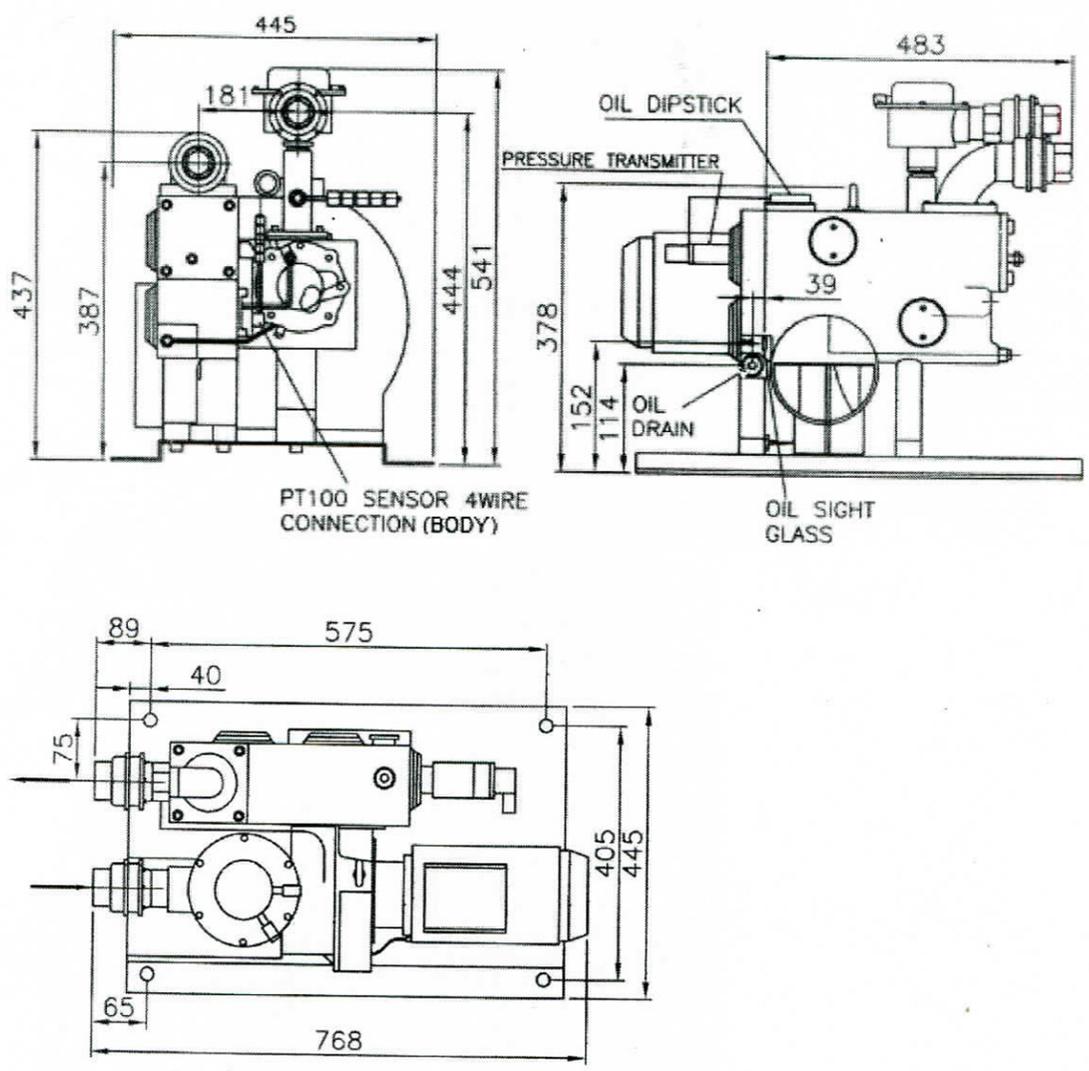



FIGURE-1

सामग्री सूची संख्या INVENTORY P-6403	REV.NO. 02		निर्माणकर्ता WORKED BY Jagdeesh		29/04/15
			जांचकर्ता CHECKED BY Pratibha		29/04/15

पृष्ठ नं. ४१ (डी) FORM DG-41(D)

डॉक्यूमेंट सर्वर पर मौजूद नर दी गई है।
DOCUMENT RELEASED FROM SERVER/CTA

हस्ताक्षर दिनांक
SIGN & DATE

डॉक्यूमेंट सर्वर पर जमा कर दी गई है।
DOCUMENT DEPOSITED IN SERVER

हस्ताक्षर दिनांक
SIGN & DATE

संशोधन पत्र
CHANGE ADVICE FORM



संशोधन सूचना संख्या
CHANGE ADVICE NO.

जारीकर्ता विभाग
ISSUING DEPTT.

उत्पाद का प्रकार
TYPE OF PRODUCT

जीएमएस/जीआ
रएसपी/सीबीएम सं
GMS / GRSP
/CBOM No.

लागू दिनांक
INFORCE FROM

स्वीकृतकर्ता
APPROVED BY
D.G.M.
330. प्रो. विद्युत मशीनें इंजीनियरिंग
330. प्रो. विद्युत मशीनें हार्डवयर

TGE-21 - 34

EME

TURBOGENERATOR

संशोधन का विवरण
DETAILS OF REVISION

प्रारंभ गद संख्या
CHARGEABLE
HEAD NO.

सौभाग्य/जीएमएस /
जीआरएसपी की
प्रकारित सं
VARIANT NO. OF
CBOM/GMS/GRSP

टिप्पणी
REMARKS

अधिकृत
हस्ताक्षर सं.
DESIGNATION
(DRAWING
No etc)

संशोधित
पृष्ठ
संख्या
REVISED
SHEET.
NO.

संशोधन
संख्या
REV. NO.

संशोधन का
कारण कोड
CODE FOR
REASON
OF CHANGE

जैसा है
AS IT EXISTS

जैसा होना चाहिए
AS IT SHOULD BE

जैसा है
AS IT EXISTS

जैसा होना चाहिए
AS IT SHOULD BE

प्रारंभ गद संख्या
CHARGEABLE
HEAD NO.

सौभाग्य/जीएमएस /
जीआरएसपी की
प्रकारित सं
VARIANT NO. OF
CBOM/GMS/GRSP

टिप्पणी
REMARKS

ROUTE

(7a)

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(11)

(12)

(13)

(14)

(15)

(16)

THIS PRODUCT STANDARD
REAFFIRMED.

TG60688
VACUUM
PUMP/ROT
ARY VANE
(TYPE)

ALL

03

CODES FOR REASON OF CHANGES:- 01- ENGINEERING ERROR INCLUDING D.O. ERRORS, 02- DESIGN UPGRADE/ INCLUDING ADDITION OF VARIANT, 03- DESIGN REVIEW/ INCLUDING CHANGES DUE TO CHANGE ADVICE IN OTHER DOCUMENTS, 04- TO MEET MANUFACTURING REQUIREMENTS, 05- TO MEET TECHNOLOGICAL MODIFICATIONS, 06- TO SUIT CUSTOMER DEMANDS, 07 TO SUIT STATUTORY REQUIREMENTS, 08 TO REPLACE DAMAGED/ TURN OUT ORIGINALS BY A FRESH ORIGINALS, 09- ANY OTHER

AGREED सहमति

(20)

नाम
NAME

हस्ताक्षर
SIGN

दिनांक
DATE

आभियांत्रिकी
ENGG.

प्रौद्योगिकी
TECHNOLO
GY

क्यालिटी
QUALITY

विभा एवं दूर
विभाग
J & T DEPTT.

वेल्डिंग
WELDING
TECHNOLOGY

केन्द्रीय संयंत्र
प्रयोग
CPL

अन्य विभाग
(OTHER DEPTT.)

निर्यातकर्ता
RELEASED BY
STANDARDS (21)

नाम
NAME

हस्ताक्षर दिनांक
SIGN & DATE

निर्माणांक
WORKED BY

Kunal Mishra

Sd/-
24.06.21

जारीकर्ता
CHECKED BY

Manju Azad

Sd/-
24.06.21

मानक नियंत्रण
STD.CONTROL

निर्माणकर्ता
ISSUED BY
(CTA)

प्राप्तकर्ता
RECEIVED BY
STANDARDS (23)

प्राप्तकर्ता
RECEIVED BY
(CTA)

पृष्ठ सं
SHEET NO

कुल पृष्ठ
TOTAL SHEETS

(25)

(26)