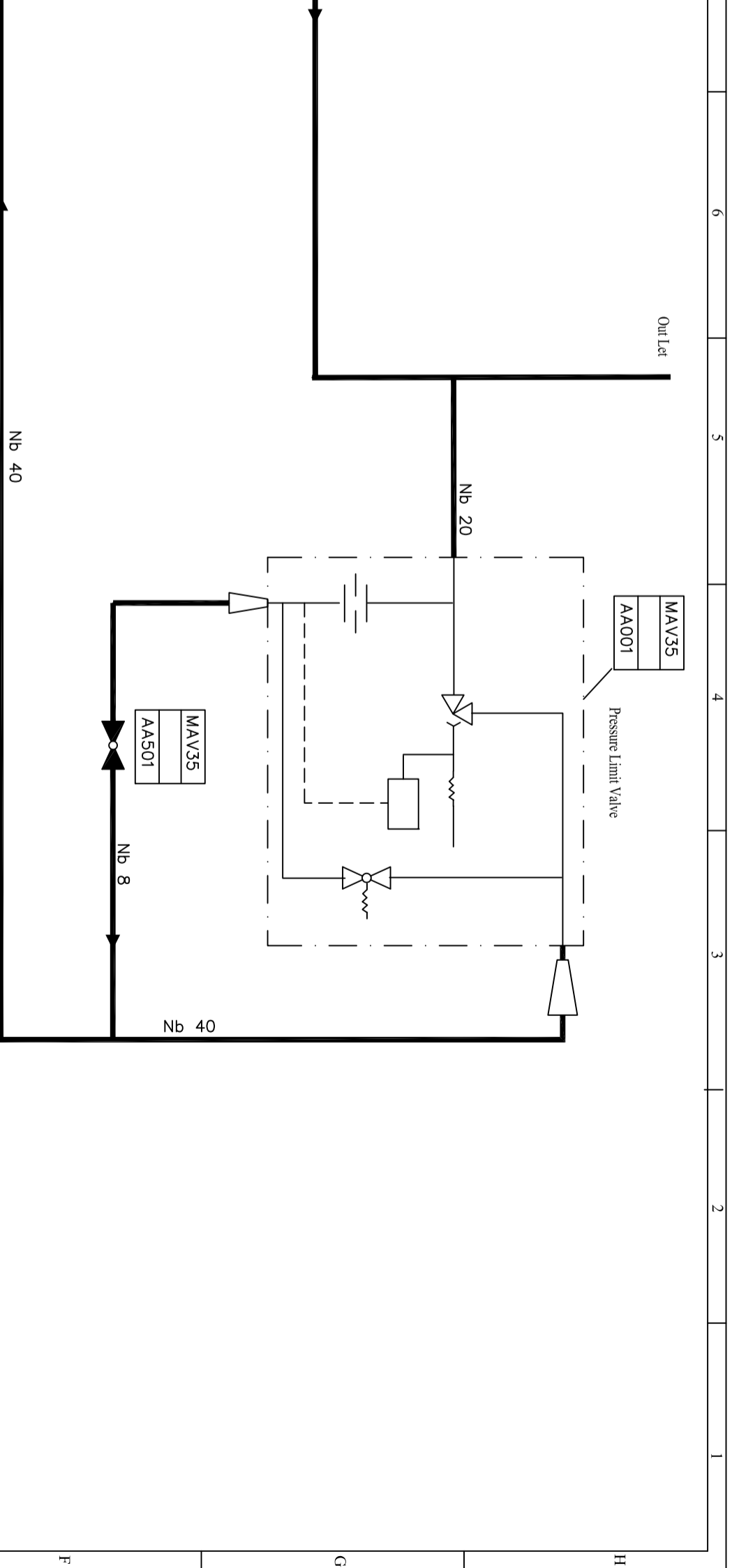
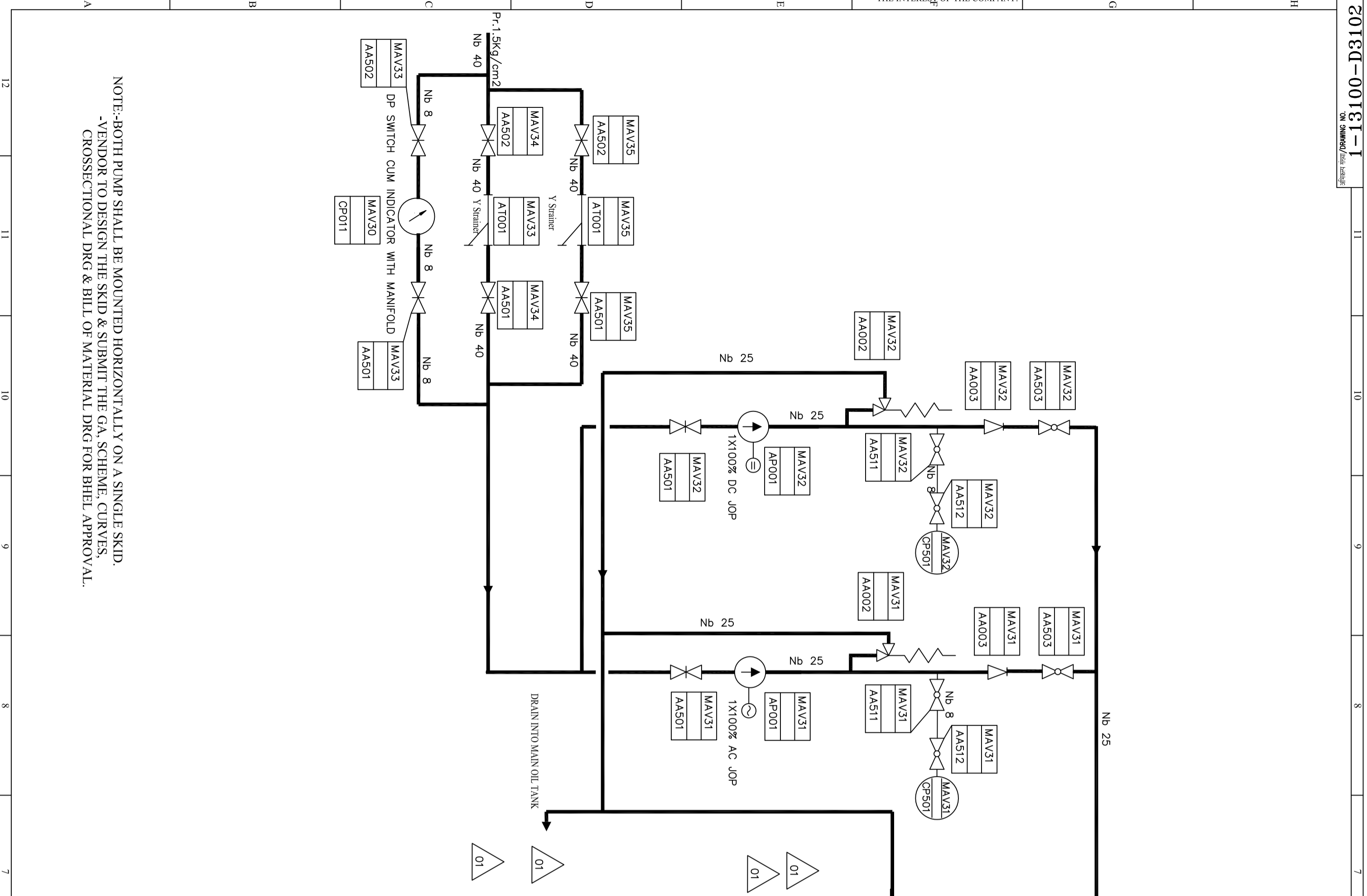


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संपूर्ण अधिकार सुरक्षित
यह दस्तावेज केवल मालिक के उपयोग के लिए है। इसे किसी भी प्रकार के बिना अनुमति के प्रसारित करने से मना है।

आवृत्ति सूची/INVENTORY NO. संकेत और दिनांक/SIGN & DATE संदर्भित आंकड़ा/REFERENCE DRG.NO.



SCOPE OF SUPPLY

S.No	ITEM NAME	SPEC	MATERIAL	TAG NOS.	SIZE	QTY.	SUGGESTIVE SUPPLIER
1	JOP AC	ST39003	As per Spec	MAV31 AP001	Q=1.33 LPS P=178 Bar	1	-
2	JOP DC	ST39007	As per Spec	MAV32 AP001	Q=1.33 LPS P=178 Bar	1	-
3	Safety Valve	Suitable for above Pumps	-	MAV31/32-AA002	As Per Pipe Size	2	BHEL TRICHY
4	Globe Valve	Minimum-C 1500	CS	MAV32AA503 MAV31AA503	As Per Pipe Size	2	BHEL TRICHY
5	Non Return Valve	Minimum-C 1500	CS	MAV31/32-AA003	NB 25	2	BHEL TRICHY
6	Pressure Limit Valve	ST47027 47025	BOSCH REXROTH Model no DB20-1-4X	MAV35AA001	As Per Pipe Size	1	This item shall be of Bosch Rexroth make.
7	Y Strainer	Suiting to P=3 Bar, Q=2.66 LPS	-	MAV33/35-AT001	100 Micron	2	-
8	DP Switch Cum Indicator With Manifold	ST46056	AS PER SPEC	MAV30CP011	Suitable to line & pressure	1	-
9	Pipe & fittings	ANSI B31.1	SS,ASTM TP321 grade	-	As Per Pipe Size	1 Set	DEE DEVELOPMENT, BENDJOINT, UNITECH MACHINES
10	Root Valves	Suiting to JOP outlet pressure & Indicator.	MAV31/32-AA511/512	MAV31/32-CP501	Suiting to JOP outlet pressure & Indicator.	4	BHEL TRICHY
11	Pressure Indicator	ST46056	-	-	-	2	-
12	Gate Valve	Minimum CI 50	-	Marked with	As Per Pipe Size	8	BHEL TRICHY

GRADE OF UNDIMENSIONED DIMENSION

MACHINING - AA0230208 m

WELDING - CLASS 'B' OF AA0621104

GAS CUTTING - TABLE 3 OF AA0621101

PROJECT ENGINEERING DEPARTMENT

PROJECT NAME: BHARAT HEAVY ELECTRICALS LIMITED, RAIPUR, HARIDWAR

DRAWING NO. 22 03 24

DATE: 16.07.14

SCALE: AS SHOWN

PROJECT NO. 4-11919-B01-20

REV. 01

NOTE:- BOTH PUMP SHALL BE MOUNTED HORIZONTALLY ON A SINGLE SKID.
- VENDOR TO DESIGN THE SKID & SUBMIT THE GA, SCHEME, CURVES,
CROSSSECTIONAL DRG & BILL OF MATERIAL DRG FOR BHEL APPROVAL.

12 11 10 9 8 7 6 5 4 3 2 1

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD (STEAM TURBINE ENGINEERING)	ST-39003
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सामग्री सूची संख्या को
SUPERSEDES
INVENTORY NO

**TECHNICAL SPECIFICATION FOR
JACKING OIL PUMP SET (A.C.)**

1.0 INTENT OF SPECIFICATION:-

THIS SPECIFICATION IS INTENDED TO COVER DESIGN, MANUFACTURE, ASSEMBLY, TESTING AND SUPPLY OF COMPLETE PUMPING SET WITH BASE PLATE, LIFTING LUGS, COUPLING, SUCTION PIPE, DISCHARGE PIPE AND STARTUP VALVE (IF REQUIRED BY VENDOR FROM PUMP SAFETY POINT OF VIEW). OTHER ACCESSORIES INCLUDING MOTOR AND THEIR COMMISSIONING AT POWER STATION.

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THE PUMPING SETS ARE INTENDED FOR OPERATION IN CONJUNCTION WITH STEAM TURBINES AND SHOULD BE SUITABLE FOR CONTINUOUS OPERATION AT AN AMBIENT TEMPERATURE OF 50°C + 90% HUMIDITY.

2.0 FUNCTION:-

JACKING OIL PUMP COMES IN OPERATION IN CONJUNCTION WITH THE BARRING OPERATION OF THE TURBINE.

3.0 APPLICABLE CODE/STANDARD:- IS:4722, IS:325, IS:2253, IS:2254, IS:3202
IS:4029, VDI:2056, VDMA 24284 .

4.0 OIL SPECIFICATION:-

THE MEDIUM HANDLED IS TURBINE OIL OF VISCOSITY CLASS ISO VG46. THE OIL CAN BE SERVO PRIME 46 OF INDIAN OIL CORPORATION OR TURBOL 46 OF BHARAT PETROLEUM OR SHELL TURBOL 46 OF BHARAT SHELL LTD.

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 ।

KINEMATIC VISCOSITY AT 65°C/20°C : 16 cs/100 cs
 SPECIFIC GRAVITY AT 65°C : 0.8488
 FLASH POINT : 200°C (min)
 OPERATIONAL TEMPERATURE : 65°C
 POUR POINT : -6.6°C (max.)

5.0 PUMP SPECIFICATION:-

5.1 IDENTIFICATION NO. TO BE MENTIONED ON NAME PLATE AS FOLLOWS:-
: MAV 31 AP 001 AND MAV 32 AP 001

हस्ताक्षर एवं दिनांक SIGN & DATE	10/2/14	नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
सामग्री सूची संख्या INVENTORY NO.	P-5134	निर्माणादक TRANSLATED BY	
		निर्माणकर्ता WORKED BY	HIMANSHU GUPTA
		जांचकर्ता CHECKED BY	HIMANSHU GUPTA
सहमत विभाग AGREED DEPT.	नाम NAME	पर्यवेक्षणकर्ता SUPERVISED BY	ANUJ JAIN
	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	स्वीकृति APPROVED :	(A.B.GUPTA) AGM
REV.NO. 13	SUPERSEDES	निर्माण PREPARED :	जारी ISSUED : TSX
Dl. 28.01.14			दिनांक : DATE : 2/11/99

उत्पाद मानक

ST-39003



PRODUCT STANDARD
(STEAM TURBINE ENGINEERING)

पृष्ठ 13 का 2

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SIGN & DATE

SUPERSEDES
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सामग्री सूची संख्या को
अधिस्थानित करना है

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स्वत्वाधिकार एवं गोपनीय
इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इस्तेमाल हेतु इस्तेमाल प्रकृत्य एवं अपरिष्कार रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।

हस्ताक्षर एवं तिथि
SIGN & DATE

सामग्री सूची संख्या
INVENTORY NO

5.2 TYPE :-SCREW OR VANE TYPE POSITIVE DISPLACEMENT

DESIGN TEMPERATURE = 100°C , OPERATING TEMPERATURE = 65°C

VARIANT NUMBER	NORMAL DISCHARGE CAPACITY (Litre/Sec.)	NORMAL DISCHARGE PRESSURE (Bar)
VAR. 1	1.26	120
VAR. 2	1.80	140
VAR. 3	1.68	189
VAR. 4	1.25	182
VAR. 5	2.25	182
VAR. 6	1.53	178
VAR. 7	1.33	182
VAR. 8	1.27	182
VAR. 9	1.84	178

VARIANT NUMBER	NORMAL DISCHARGE CAPACITY (Litre/Sec.)	NORMAL DISCHARGE PRESSUR E (Bar)
VAR. 10	1.70	175
VAR. 11	1.30	155

PUMP SHALL BE SUITABLE FOR MOUNTING VERTICALLY ON THE MAIN OIL TANK. BASE PLATE OF PUMP SHALL MATCH THE COUNTER FLANGE PROVIDED ON THE TANK AS PER SKETCH ON PAGE 13. SMOOTH FUNCTIONING IS ENSURED BY MAINTAINING OIL LEVELS AS DEPICTED IN THE ARRANGEMENT ON PAGE NO. 12.

5.3 DURING INITIAL START UP IN WINTER, OIL TEMPERATURE MAY GO AS BELOW AS 20°C.

6.0 MOTOR:-

A SUITABLE MOTOR CONFORMING TO THE PUMP REQUIREMENTS SHALL BE SUPPLIED. FOR DETAILS ON MOTOR, REFER ANNEXURE-I ON PAGE NO. 7.

7.0 DESIGN AND CONSTRUCTION OF PUMP:-

ALL MATERIALS USED IN THE CONSTRUCTION OF THE PUMPS SHALL BE SELECTED FROM THE RANGE OF MATERIAL MOST APPROPRIATELY SUITABLE FOR THE PURPOSE AND SERVICE CONDITIONS. THE BIDDER SHALL FURNISH ALONG WITH THE OFFER, MATERIAL SPECIFICATION FOR ALL THE COMPONENTS TO BHEL FOR THEIR REVIEW AND ACCEPTANCE BY BHEL/ITS CUSTOMER. BHEL/ITS CUSTOMER RESERVES THE RIGHT TO ASK FOR CHANGES IN MATERIAL. THE SIZE SHALL BE STANDARDIZED SO AS TO ENSURE INTERCHANGEABILITY.

THE SUCTION, DISCHARGE AND DRAINAGE SIZES AND TYPE OF CONNECTIONS SHALL BE AS FOLLOWS.

SUCTION- $\phi 60.3 \times 4$ TYPE OF CONNECTION BUTT WELDED.

DISCHARGE- $\phi 33.4 \times 4.5$ TYPE OF CONNECTION BUTT WELDED.

DRAINAGE INLET- $\phi 33.4 \times 3.4$ TYPE OF CONNECTION BUTT WELDED.

DRAINAGE OUTLET- $\phi 33.4 \times 3.4$ TYPE OF CONNECTION BUTT WELDED (FLANGED CONNECTION DIN: 2633 IS TO BE SUPPLIED WITH COUNTER FLANGE, O-RING, BOLTS, NUTS, AND WASHER).


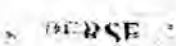
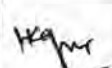

7.1 SPECIAL TOOLS AND TACKLES

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.

REV. NO. 13

निर्माणकर्ता WORKED BY	H. GUPTA	<i>Hgms</i>	8/2/14
जांचकर्ता CHECKED BY	ANUJ JAIN	<i>Ajain</i>	8/2/14

18/12/14
P-5134

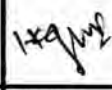

दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;">उत्पाद मानक</p> <p style="text-align: center;">PRODUCT STANDARD (STEAM TURBINE ENGINEERING)</p>	ST-39003			
सामग्री सूची संख्या को अधिष्ठापित करना SUPERSEDES INVENTORY			पृष्ठ 13 का 3 Page 3 of 13			
COPYRIGHT AND CONFIDENTIAL The information 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.		<p>7.2 THE MATERIALS OF CONSTRUCTION OF THE PUMPS SHALL BE SUCH AS TO RESIST CORROSION AND EROSION AND SHALL GIVE LONG TROUBLE FREE SERVICE.</p> <p>7.3 THE SUPPLIER SHALL ALSO FURNISH THE METHOD AND FREQUENCY OF LUBRICATION OF THE BEARINGS AND QUANTITY AND TYPE OF LUBRICANT REQUIRED FOR NORMAL OPERATION. BUT LUBRICATION OF BEARING WITH THE OIL BEING HANDLED IS PREFERRED.</p> <p>7.4 THE DESIGN SHALL BE SUCH AS TO KEEP THE FRICTIONAL LOSS AND WEAR CAUSED BY END THRUST TO THE MINIMUM. IT WILL ALSO ENSURE MINIMUM WEAR AND CAVITATION IN MECHANICAL SEALS AND BEARINGS. LONG AND TROUBLE FREE SERVICE SHALL BE ENSURED. THE ROTORS OF THE PUMP SHOULD BE DESIGNED IN SUCH A WAY SO THAT MINIMUM VIBRATIONS ARE EXPERIENCED. THE SOUND PRESSURE LEVEL OF PUMP MOTOR SET SHOULD NOT BE GREATER THAN 85 dBA TO A REFERENCE OF 0.0002 MICRO BAR WHEN MEASURED AT A DISTANCE OF 1.5 METERS ABOVE FLOOR LEVEL AND ONE METERS HORIZONTALLY FROM THE BASE OF THE EQUIPMENT AND VIBRATIONS ARE IN THE PERMISSIBLE RANGE AS PER VDI 2056.</p> <p>7.5 SEALS MUST COMPLY WITH THE FOLLOWING PROPERTIES:-</p> <p>(a) READY ACCESS AND AMENABILITY FOR MAINTENANCE WORK.</p> <p>(b) NO CONTAMINATION OF THE MEDIUM FROM MATERIAL ABRADED FROM THE SEALS.</p> <p>(c) NO SEEPAGE OF LUBRICANTS INTO THE FLOW MEDIUM.</p> <p>(d) MINIMUM LEAKAGE LOSSES WITH THEIR CONTROLLED REMOVAL.</p> <p>7.6 TO FACILITATE TRANSPORT AND ERECTION, LIFTING HOOKS OR ERECTION EYES SHALL BE FITTED AT SUITABLE POINTS ON THE COMPONENTS. THEIR LOCATIONS MUST BE SHOWN ON THE DIMENSIONAL DRAWING.</p> <p>7.7 PUMP BEARINGS SHALL BE DESIGNED SO AS TO ASSURE 50,000 hrs CONTINUOUS SERVICE FOR FRICTION BEARINGS AND 30,000 hrs FOR BALL AND ROLLER BEARINGS.</p> <p>7.8 MECHANICAL DESIGN SHALL ALLOW EASY ACCESS TO VARIOUS PARTS FOR CARRYING OUT MAINTENANCE WORK.</p> <p>7.9 THE DISCHARGE BRANCH OF THE PUMP SHALL BE TAKEN OUT 100 MM ABOVE THE BASE PLATE BY THE SUPPLIER.</p> <p>7.10 THE PUMPS SHALL BE PROVIDED WITH DRAINAGE AND VENTING DEVICES.</p> <p>7.11 ALL SYSTEM PARTS CARRYING OIL SHALL BE OF OIL TIGHT CONSTRUCTION, COMPRESSION-TYPE FITTINGS ARE NOT PERMISSIBLE.</p> <p>7.12 FOR PUMPS RUNNING AT SUBCRITICAL SPEEDS, IT SHALL BE ENSURED THAT THE CRITICAL SPEED LIES ABOVE THE MAXIMUM SPEED ATTAINABLE DURING OPERATION WITH A MINIMUM MARGIN ON 15% OF RATED SPEED. FOR PUMPS RUNNING AT SUPER CRITICAL SPEEDS, IT SHALL BE ENSURED THAT THERE IS A DIFFERENCE OF SUFFICIENT MAGNITUDE (NOT LESS THAN 20%) BETWEEN THE OPERATING SPEED AND THE BORDER IN CRITICAL SPEEDS. ALLOWANCES SHALL BE MADE FOR THE TYPE OF COUPLING BETWEEN THE PUMP AND MOTOR WHILE CALCULATING THE CRITICAL SPEEDS.</p>				
स्वत्वाधिकार एवं गोपनीय इस प्रलेख में बी.एच.ई.एल. भारत भारती 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 & DATE 18/2/14						
सामग्री सूची संख्या INVENTORY NO. P-5134	REV. NO. 13			निर्माणकर्ता WORKED BY H. GUPTA		8/2/14
				जांचकर्ता CHECKED BY ANUJ JAIN		8/2/14

सामग्री सूची संख्या को.अधिकृतित करना	SUPERSEDES INVENTORY	<p>7.13 COUPLING SUITABLE COUPLING WITH GUARDS SHALL BE PROVIDED FOR COUPLING PUMP WITH MOTOR. IT SHALL BE DESIGNED TO FACILITATE EASY ALIGNMENT. ONE SET OF COUPLING BOLTS SHALL BE SUPPLIED IN SPARE. COUPLING BETWEEN PUMP AND MOTOR SHOULD BE SUITABLE FOR LIFTING THE MOTOR WITH OR WITHOUT LIFTING COMPLETE ASSEMBLY.</p> <p>7.14 FOUNDATION THE PUMP SHALL BE MOUNTED ON THE MAIN OIL TANK AND HUNG FROM BED PLATE AT THE TANK TOP INTO THE TANK. FOR FURTHER DETAILS REFER PAGE NO. 12 & 13. ALL THE SEATING MACHINED SURFACES OF BED PLATE TO BE MAINTAINED FOR 0.5 mm FLATNESS.</p>
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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>8.0 QUALITY ASSURANCE, INSPECTION AND TESTING</p> <p>(a) THE MANUFACTURER SHALL CONDUCT ALL TESTS REQUIRED TO ENSURE ALL THE COMPONENTS/ PART OF THE JACKING OIL PUMP OFFERED, CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND IN COMPLIANCE WITH REQUIREMENTS OF APPLICABLE CODES AND STANDARDS.</p> <p>(b) THE BIDDER SHALL SUBMIT QUALITY PLAN ALONG WITH HIS OFFER.</p> <p>8.0.1 THE TESTING MEDIUM SHALL BE TURBINE OIL (AS SPECIFIED IN POINT NO.4 AT PAGE NO.1).</p> <p>8.1 THE PARTICULARS OF THE PROPOSED SHOP TESTS AND PROCEDURES FOR THE TESTS SHALL BE SUBMITTED TO BHEL / ITS CUSTOMER FOR APPROVAL ALONG WITH QUALITY PLAN.</p> <p>8.2 THE MATERIAL SHALL BE DISPATCHED ONLY AFTER INSPECTION AND CLEARANCE OF MATERIAL BY BHEL OR ITS CUSTOMER AND APPROVAL OF TEST CERTIFICATE BY BHEL / ITS CUSTOMER.</p> <p>8.3 THE MINIMUM TESTS/CHECKS TO BE CARRIED OUT ON THE JACKING OIL 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 FINALIZATION.</p>
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स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है। इसका प्रयोग एवं आरक्षण के बिना किसी भी तरह से किया जाये, जो कि कंपनी के हित में हानिकारक हो न किया जाये।	<p>8.3.1 TESTING OF MATERIALS</p> <p>THE MATERIAL OF EACH COMPONENT SHALL BE TESTED AS PER RELEVANT SPECIFICATION FOR ITS CHEMICAL COMPOSITION AND MECHANICAL PROPERTIES, VIZ. YS, UTS, IMPACT, % ELONGATION % RA Etc. TO ENSURE FREEDOM FROM SURFACE AND SUB-SURFACE DEFECTS, NDT & UT SHALL BE CARRIED OUT ON SHAFT, NDT, MPI ON SCREWS/VANES AND CASING ALSO BE CARRIED OUT. THE WHOLE RESPONSIBILITY LIES WITH VENDOR OF TESTING THE MATERIAL AS PER RELEVANT STANDARD.</p>
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हस्ताक्षर एवं दिनांक SIGN & DATE 18/2/14	<p>8.3.2 FOLLOWING TESTS SHALL BE CARRIED OUT DURING VARIOUS STAGES OF MANUFACTURE AT MANUFACTURER WORKS.</p> <p>(a) CHECK FOR DIMENSIONS OF ALL COMPONENT PARTS INCLUDING SURFACE FINISH, AXIAL AND RADIAL RUN-OUT OF SHAFT ETC.</p> <p>(b) NON-DESTRUCTIVE EXAMINATION: - UT FOR SCREW/VANE BLANKS AND DPT/MPI ON SCREWS/VANES TO BE CARRIED OUT TO ENSURE SURFACE/SUB-SURFACE DEFECTS.</p>
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सामग्री सूची संख्या INVENTORY NO P-5194	REV. NO. 13		निर्माणकर्ता WORKED BY H. GUPTA	 28/2/14
			जांचकर्ता CHECKED BY ANUJ JAIN	 8/2/14



उत्पाद मानक

ST-39003

PRODUCT STANDARD
(STEAM TURBINE ENGINEERING)

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को अधिकाधिक करना

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स्वत्वधिकार एवं गोपनीय

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हस्ताक्षर एवं दिनांक
SIGN & DATE

11/10/14

सामग्री सूची संख्या
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- (c) CHECK THE CONDITION OF THE OIL SEALS AND ANY SEEPAGE OF OIL THROUGH SEALS ETC.
- (d) HYDRAULIC TESTING OF THE CASING AND OTHER PRESSURE PARTS SHALL BE AS PER VDMA 24284.
- (e) PERFORMANCE TEST WITH RESPECTIVE INDIVIDUAL JOB MOTOR FOR VERIFICATION OF PUMP CHARACTERISTICS, VIZ. DISCHARGE AT THE GIVEN PRESSURE, SCHEDULE OF POWER CONSUMPTION AS PER VDMA 24284, NOISE AND VIBRATION LEVEL AS PER VDI 2056.
- (f) STRIP DOWN TEST TO CHECK THE CONDITION OF BEARING, MECHANICAL CLEARANCES, AND AXIAL PLAY OF SHAFT ETC.

8.3.3 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.

8.3.4 TEST CERTIFICATES INDICATING THE ACTUAL TEST RESULTS OF MATERIAL TESTING, NDT, HYDRAULIC TEST, PERFORMANCE TEST, STRIP DOWN EXAMINATION Etc. SHALL BE FURNISHED FOR BHEL INFORMATION.

9.0 PRE-APPROVAL DOCUMENTS AT THE TIME OF OFFER

9.1 ASSEMBLY DRAWING WITH PART LISTS, NOZZLE SIZES AND THEIR COORDINATES, BASE PLATE DETAILS AND CROSS SECTION ARRANGEMENT ALONG WITH STATIC LOADING.

9.2 CALCULATIONS WITH NECESSARY DRAWINGS (TORQUE/SPEED CHARACTERISTICS Etc), POWER REQUIREMENTS, TORQUE SETTING VALUE FOR MOTOR TRIP, PERMISSIBLE TORQUE VALUE FOR KEY AND POWER SHAFT.

9.3 MAXIMUM MAGNETIC AND NON-MAGNETIC PARTICLE SIZE, WHICH CAN PASS THOROUGH PUMP SCREW/VANE CLEARANCE WITHOUT DAMAGING THE PUMP SHALL BE SPECIFIED IN THE OFFER.

9.4 QUALITY PLAN WITH DETAILS OF QUALITY LEVELS AND MANUFACTURING TOLERANCES. THIS SHOULD GENERALLY CONFORM TO VDMA 24284. GENERALLY ACCEPTED ENGINEERING PRACTICES, IN PARTICULAR VDMA CODES AND STANDARDS OR EQUIVALENT SHALL BE APPLIED AND TAKEN INTO ACCOUNT FOR DESIGN OF SCREW/VANE PUMPS. THE CODES OF STANDARDS APPLIED IN EACH CASE SHALL BE SPECIFIED IN THE OFFER.

9.5 FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE-I. EXAMINATION OF THE PRE-APPROVED DOCUMENTS BY BHEL SHALL NOT RELIEVE THE MANUFACTURER AND HIS SUBCONTRACTORS OF THEIR RESPONSIBILITIES.

9.6 THE PRE-APPROVED DOCUMENTS SHALL FORM THE BASIS FOR THE ORDER. NO CHANGES SHALL BE MADE WITHOUT APPROVAL FROM BHEL.

10.0 DOCUMENTS TO BE SUPPLIED AFTER THE PLACEMENT OF ORDER:

THESE SHALL BE SUPPLIED IN SOFT COPY VIA MAIL OR BY CD AS PER FOLLOWING SCHEDULE:

- 10.1** CONTRACTUAL DRAWINGS - 4 WEEKS
- 10.2** OVERHAUL AND SPARE PARTS LISTS - 4 WEEKS
- 10.3** EQUIPMENT DESCRIPTION - 4 WEEKS

निर्माणकर्ता

WORKED BY

H. GUPTA

H Gupta

8/2/14

जांचकर्ता

CHECKED BY

ANUJ JAIN

Anuj Jain

8/2/14



उत्पाद मानक

ST-39003

PRODUCT STANDARD
(STEAM TURBINE ENGINEERING)

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को अधिकाधिक करता

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स्वत्वाधिकार एवं गोपनीय

इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रकाश एवं आरक्षण इस से किसी भी तरह प्रयोग, जो कि गोपनीय के हित में हानिकारक हो न किया जाए

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सामग्री सूची संख्या
INVENTORY NO

P-5734

REV. NO. 13

निर्माणकर्ता
WORKED BY

H. GUPTA

Hgupta

8/2/14

जांचकर्ता
CHECKED BY

ANUJ JAIN

AJain

8/2/14

10.4 TEST CERTIFICATE OF ALL TESTS AS PER QUALITY PLAN, DRAWINGS DURING VARIOUS STAGES OF MANUFACTURE. ALSO REFER CLAUSE 8.2 AND 8.3.4 ABOVE. - BEFORE DISPATCH

10.5 LIST OF TOOLS AND TACKLES - 4 WEEKS

10.6 THE STATIC AND DYNAMIC LOADING DETAILS ON SUPPORT/FOUNDATION SHOULD BE FURNISHED. - 4 WEEKS

10.7 FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE I.

10.8 O & M MANUALS (10 HARD COPIES+2CD)

11.0 NAME PLATE IDENTIFICATION MARKINGS SHOULD BE AS FOLLOWS:

11.1 TYPE / DESIGNATION

11.2 MANUFACTURER

11.3 MANUFACTURER'S WORKS NO.

11.4 YEAR OF MANUFACTURING

11.5 PURCHASER'S ORDER NO.

11.6 VOLUMETRIC FLOW (l/min)

11.7 DISCHARGE PRESSURE (Bar/MWC)

11.8 OPERATING TEMPERATURE (°C)

11.9 FLOW MEDIUM.

11.10 SPEED.

11.11 BILINGUAL IN HINDI AND ENGLISH LANGUAGES.

11.12 THE PUMP DATA SHEETS, GA DRAWING, CHARACTERISTIC CURVES, AND CROSS SECTIONAL DRAWING SHALL BE REQUIRED TO BE APPROVED BY BHEL/BHEL'S CUSTOMER/CUSTOMER'S CONSULTANT.

11.13 KKS IDENTIFICATION i.e. MAV31AP001 & MAV32AP001.

12.0 CLEANING, PAINTING, CONSERVATION & PACKING:

THE SURFACE SHALL BE CLEANED & PREPARED FOR APPLICATION OF THE COATINGS BY BLASTING WITH NON-SILICATIC ABRASIVE AGENTS. THE PROTECTIVE COATING SHOULD BE OIL RESISTANT TO PREVENT CONTAMINATION OF OIL SPECIFIED TO PREVENT THE DETERIORATION OF THE COATING ITSELF. THE SUPPLIER SHALL GIVE EXACT AND PRECISE DETAILS ABOUT THE MEASURES ENVISAGED BY HIM FOR SURFACE PROTECTION, WHICH SHALL BE CHECKED AND APPROVED BY BHEL.

INSTRUCTIONS SHOULD BE ISSUED REGARDING RECONSERVATION, DECONSERVATION ALONG WITH SPECIFICATION OF MATERIAL TO BE USED FOR ABOVE PURPOSE. 100% QUANTITY OF COATING MATERIAL SHALL BE SUPPLIED ALONG WITH THE PUMP FOR RECONSERVATION AND DECONSERVATION AT SITE DURING STORAGE. ANY SPECIFIC INSTRUCTION TO BE FOLLOWED DURING STORAGE AT SITE TO AVOID ANY SEIZING ETC. SHALL ALSO BE INTIMATED. ALL SUCH INSTRUCTIONS SHALL BE MADE AVAILABLE TO SITE INCHARGE IN A SEPARATE COVER (NOT PACKED WITH PUMP PACKAGE).

THE SUPPLIER SHALL BE RESPONSIBLE FOR ALL LOSS OR DAMAGE DURING TRANSPORTATION, HANDLING AND STORAGE DUE TO IMPROPER PACKING.

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13.0 GENERAL

SUPPLIER TO CLEARLY MENTION THE DEVIATION TAKEN AGAINST SPECIFICATION IN THEIR OFFER. SUPPLIER SHALL ALSO FILL IN THE BLANK DATA SHEET AS PER ANNEXURE-II 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 SPECIFICATION ARE NOT SUBMITTED ALONG WITH THE OFFER.

13.1 SUPPLIER TO PERFORM TWO VISIT AT SITE:-

SUPERVISION OF VENDER REQUIRED DURING ERECTION AND COMMISSIONING AT SITE.

13.1.1 FIRST VISIT TO CHECK AND REPLACE MOTOR'S BEARINGS, PUMP'S SUCTION AND DISCHARGE O-RING (IF REQUIRED) AND TO CHECK THE CONDITION OF THE PUMP SET BEFORE INSTALLATION OF PUMP/MOT OIL FILLING.

13.1.2 SECOND VISIT TO SUPERVISE THE COMMISSIONING OF PUMP SET.

14.0 GUARANTEE

14.0.1 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 WHICHEVER IS EARLIER.

14.0.2 THE SUPPLIER SHALL GUARANTEE THE CAPACITY, HEAD AND EFFICIENCY OF THE PUMP AS PER THE TESTED CHARACTERISTIC WITH OIL.

14.0.3 IF DURING ERECTION AT SITE ANY DEFICIENCY IN A PART 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 CHARGE. THE SUPPLIER IF HE SO DESIRE MAY DEPUTE HIS REPRESENTATIVE TO SITE OTHERWISE THE FINDING OF BHEL REPRESENTATIVE SHALL BE FINAL AND BINDING ON THE SUPPLIER OF PUMPING SET.

14.0.4 THE SUPPLIER SHALL REPAIR /REPLACE THE DEFECTIVE PARTS AT HIS OWN COST DURING THE GUARANTEE PERIOD.

15.0 SPARES
THE SUPPLIER SHALL QUOTE ITEM WISE PRICE OF RECOMMENDED SPARES FOR 3 YEARS AND 5 YEARS OPERATION RESPECTIVELY.

ANNEXURE - I
SPECIFICATION OF A.C. MOTOR FOR JACKING OIL PUMP

M1.0 A SUITABLE MOTOR CONFORMING TO THE JACKING OIL PUMP REQUIREMENT SHALL BE SUPPLIED. THE MOTOR SHALL CONFORM TO IS:325, IS:2253, IS:2254, IS: 3202, IS: 4029, IS 12615:2011 AND IS: 4722 OR EQUIVALENT BS SPECIFICATION. THE MOTOR SHALL MATCH THE REQUIREMENTS OF DRIVEN EQUIPMENT IN ALL RESPECTS. THE MOTOR SHALL ALSO MEET THE FOLLOWING REQUIREMENTS BROADLY. THE MOTOR SHALL MEET ALL INDIAN STATUTORY REQUIREMENTS.

M2.0 APPLICATION
TO DRIVE JACKING OIL PUMP FOR SUPPLYING HIGH PRESSURE OIL TO TURBINE BEARINGS.

M3.0 TYPE OF MOTOR: SQUIRREL CAGE, INDUCTION MOTOR.

M3.1 KW RATING
IT SHALL HAVE AT LEAST 15% RESERVE CAPACITY OVER AND ABOVE REQUIRED POWER TO DRIVE THE PUMP WHEN IT IS DISCHARGING MAX. QUANTITY.

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		जांचकर्ता CHECKED BY	ANUJ JAIN		8/2/14

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PRODUCT STANDARD
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दिनांक एवं हस्ताक्षर
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- M3.2** KW ACTUALLY REQUIRED BY DRIVEN EQUIPMENT : PUMP CAPACITY UNDER SPECIFIED OPERATING /START UP
- M3.3** RATED VOLTAGE : 415V
FREQUENCY : 50HZ
- M3.4** PERMISSIBLE VOLTAGE & FREQUENCY : ±10% VOLT
VARIATION UNDER NORMAL RUNNING : ±5% FREQUENCY
CONDITIONS COMBINED VARIATION. :10% (SUM OF ABSOLUTE VALUES)
- M3.5** MINIMUM VOLTAGE REQUIRED UNDER STARTING : 80% RATED
CONDITIONS TO BRING DRIVEN EQUIPMENT UPTO RATED SPEED.
- M3.6** NO. OF PHASES : 3 PHASE
- M3.7** TYPE OF DUTY : CONTINUOUS
- M3.8** FULL LOAD SPEED : IT SHALL BE COMMENSURATE WITH PUMP SPEED AS PER DESIGN.
- M3.9** FULL LOAD CURRENT : AS PER DESIGN
- M3.10** STARTING CURRENT : NOT TO EXCEED 600% OF RATED (EXCLUSIVE OF IS: TOLERANCES)
- M3.11** STARTING TORQUE : 1.3 TIMES (min.) OF RATED TORQUE.
- M3.12** BREAK DOWN TORQUE : 2.05 TIMES (min.) OF RATED VALUE.
- M3.13** EFFICIENCY AT FULL LOAD : IE2 AS PER IS 12615:2011
- M3.14** POWER FACTOR AT FULL LOAD : 0.85 (min.)
- M3.15** MOTOR SHALL BE DESIGNED TO WITHSTAND THE VOLTAGE AND TORQUE STRESSES DEVELOPED DUE TO THE DIFFERENCE BETWEEN THE MOTOR RESIDUAL VOLTAGE AND INCOMING SUPPLY VOLTAGE EQUAL TO 150% OF THE RATED MOTOR VOLTAGE DURING FAST CHANGEOVER OF BUSES.
- M4.0** STARTING DATA
- M4.1** STARTING:DOL START AS WELL AS STAR DELTA.
- M4.2** ACCELERATION TIME WITH FULL LOAD CONNECTED : 3.5±0.5 SECONDS
- M4.3.** LOCKED ROTOR WITHSTAND TIME UNDER HOT CONDITIONS AT RATED VOLTAGE 2.5 SECONDS MORE THAN STARTING TIME.
- M4.4** PERMISSIBLE STARTING DUTY : 3 STARTS EQUALLY SPREAD OVER AN HOUR & 2 CONSECUTIVE STARTS FROM HOT CONDITION WITHOUT ANY INJURIOUS HEATING TO WINDINGS.
- M4.5** OVERLOAD (% OF FULL LOAD) THAT CAN BE CARRIED BY MOTOR WITHOUT IMPAIRING OVERALL PERFORMANCE AND PERIOD FOR WHICH THIS OVERLOAD IS APPLICABLE. : MOTOR SHALL BE CAPABLE OF RUNNING AT FULL LOAD AT 80% OF RATED VOLTAGE FOR FIVE MINUTES AND 70% OF RATED VOLTAGE FOR 1 SEC.
- M4.6** LOCATION : INDOOR
- M4.7** CLASS OF INSULATION : CLASS F, FUNGUS RESISTANT, TROPICALISED AS PER IS: 3202, WITH TEMP. RISE LIMITED TO THAT OF CLASS B.
- M4.8** MECHANICAL CONSTRUCTION
- M4.8.1** SHAFT DISPOSITION MOUNTING : VERTICAL/FLANGE MOUNTED
- M4.8.2** METHOD OF CONNECTION TO DRIVEN EQUIPMENT. : FLANGE FLEXIBLE COUPLING.


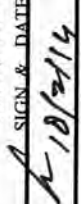
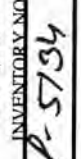


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निर्माणकर्ता WORKED BY	H. GUPTA	<i>H Gupta</i>	8/2/14
जांचकर्ता CHECKED BY	ANUJ JAIN	<i>Anuj</i>	8/2/14

18/2/14

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SUPERSEDES INVENTORY सामग्री सूची संख्या को अधिगणित करना	<p>M4.8.3 DIRECTION OF ROTATION AND CORRESPONDING TERMINAL DESIGNATION. : TO SUIT PUMP</p> <p>M4.8.4 ENCLOSURE AND VENTILATION : TOTALLY ENCLOSED FAN COOLED IP-55.</p> <p>M4.8.5 BEARING : THRUST BEARING, MIN. STANDARD LIFE NOT LESS THAN 30,000 WORKING HOURS.</p> <p>M4.8.6 GROUNDING DEVICE : SUITABLE ARRANGEMENT SHALL BE PROVIDED FOR EARTHING THE MOTOR AT TWO SEPARATE AND DISTINCT CONNECTION POINTS. DESIGN OF EARTHING CONDUCTOR SHALL BE AS PER IS: 4722.</p> <p>M4.8.7 TERMINAL CONNECTORS FOR STATOR LEADS TYPE AND NUMBER. : 6, NEUTRAL SHALL BE CONNECTED EXTERNALLY IN THE TERMINAL BOX.</p> <p>M4.9 TERMINAL BOX : TERMINAL BOX SHALL BE PROVIDED WITH DOUBLE COMPRESSION TYPE BRASS CABLE GLANDS (Nickel Chromium PLATED HEAVY DUTY, CONFIRMING TO BS:6121) AND COPPER CABLE LUGS TO MATCH OWNER'S ALUMINUM CABLES, THE SIZE OF WITCH SHALL BE INTIMATED LATER. TERMINAL BOX SHALL BE CAPABLE OF BEING ROTATED THROUGH 180° IN STEPS OF 90°. IT SHALL HAVE A DEGREE OF PROTECTION OF IP-55. IT SHALL ALSO BE SUITABLE TO WITHSTAND THE FAULT LEVEL OF 50 KA FOR 0.25 SECONDS.</p> <p>M4.10 WHETHER PHASES SEGREGATED : NO.</p> <p>M4.11 SPACE HEATERS : TO BE PROVIDED.</p> <p>M4.12 RATED VOLTAGE FOR SPACE HEATERS : 240 VOLTS</p> <p>M5.0 SPECIAL REQUIREMENTS:</p> <p>M5.01 THE MOTOR SHALL BE RE-WOUNDABLE.</p> <p>M5.02 THE MOTOR SHALL HAVE ON LINE GREASING FACILITY.</p> <p>M5.03 THE MOTOR CONSTRUCTION SHALL BE SUITABLE FOR EASY DISASSEMBLY AND REASSEMBLY.</p> <p>M5.04 THE MOTOR SHALL BE SUITABLE FOR WORKING IN AN ENVIRONMENT OF OIL FUMES WITHOUT ANY HAZARD.</p> <p>M5.05 SEPARATE TERMINAL BOX FOR SPACE HEATERS SHALL BE PROVIDED.</p> <p>M5.06 MOTOR SHALL BE PAINTED WITH PAINT SUITABLE FOR WORKING CONDITION AND ITS COLOR SHALL BE INTIMATED LATER ON.</p> <p>M5.07 THE MOTOR SHALL BE THOROUGHLY DEGREASED AND SHARP EDGES AND SCALES REMOVED AND TREATED WITH ONE COAT OF PRIMER AND TWO COATS OF ENAMEL PAINT. MOTOR FAN ALSO BE PAINTED TO WITHSTAND CORROSION.</p> <p>M5.08 MOTOR BEARINGS (DE & NDE) SHALL BE SEALED TYPE TO AVOID FREQUENT RE-GREASING.</p>					
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			जांचकर्ता CHECKED BY	ANUJ JAIN		8/2/14

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सामग्री सूची संख्या INVENTORY NO	SUPERSEDES INVENTORY	M5.09 LIMITS OF MECHANICAL VIBRATIONS SEVERITY SHALL BE LIMITED TO VIBRATION GRADE "R" (REDUCED) AS PER IS: 12075. M6.00 TESTS AT MANUFACTURER'S WORKS:- (i) BOTH TYPE & ROUTINE TEST ARE TO BE PERFORMED ON COMPLETE PUMP MOTOR ASSEMBLY AS PER IS: 4722. TYPE TEST SHOULD NOT BE MORE THAN 5 YEARS OLD w.r.t. DATE OF ORDERING. (ii) IN ADDITION THE FOLLOWING TESTS SHALL ALSO BE CARRIED OUT: (a) ADDITIONAL TYPE TESTS: DEGREE OF PROTECTION TEST TO CONFORM TO THE SPECIFIED DEGREE OF PROTECTION. IN CASE THE TEST IS ALREADY CARRIED ON THE SAME FRAME SIZE OF MACHINE, THEN TEST REPORT SHOULD BE FURNISHED. (b) ADDITIONAL ROUTINE TESTS: i. 20% OVER SPEED TEST FOR 2 MINUTES. ii. MEASUREMENT OF VIBRATION AS PER IS: 12075. iii. MEASUREMENT OF NOISE AS PER IS: 12065. MOTOR NOISE LEVEL SHALL BE LIMITED SO AS TO ACHIEVE PUMP-MOTOR SET NOISE LEVEL AS GIVEN IN CLAUSE 7.4 ON PAGE-3.				
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.	M7.0 DATASHEET/CHARACTERISTICS DOCUMENTS AS PER FOLLOWING DATA TO BE SUPPLIED WITH OFFER:- THE OFFER SHOULD BE ACCOMPANIED WITH FOLLOWING DOCUMENTS IN TWO COPIES. THE OFFER WILL NOT BE CONSIDERED IF ALL THESE DOCUMENTS ARE NOT SUPPLIED. M7.1 CHARACTERISTICS AT 80% , 100% AND 110% VOLTAGES: M7.1.1 STARTING CURRENT V/S TIME. M7.1.2 TORQUE V/S SLIP. M7.1.3 THERMAL WITHSTANDS CHARACTERISTIC FOR HOT AND COLD CONDITION. M7.2 TYPE AND FRAME SIZE. M7.3 STARTING TIME. M7.3.1 WITH 100% VOLTAGE AT TERMINAL. M7.3.2 WITH 85 % VOLTAGE AT TERMINAL. M7.3.3 WITH 80 % VOLTAGE AT TERMINAL. M7.4 SAFE STALL TIME AT 100 % RATED VOLTAGE UNDER HOT CONDITION. M7.5 POWER (KW) RATING CALCULATION w.r.t. PUMP REQUIREMENT. M7.6 EXPECTED LIFE OF BEARING. M7.7 DATA IN RESPECT OF ALL ITEMS MENTIONED AT PARA M1.0 TO M5.0 OF ANNEXURE I. M8.0 DOCUMENTS TO BE FURNISHED WITHIN FOUR WEEKS OF PLACEMENT OF ORDER (FOR BHEL OR THEIR CUSTOMER'S APPROVAL):- M8.1 SIX HARD COPIES AND ONE SOFT COPY (IN PDF FORMAT) OF MOTOR DATA SHEET AND G.A. DRAWING. M8.2 DRAWING SHOWING TERMINAL DETAIL OF ALL TERMINALS AND LOCATION AND DIMENSION OF TERMINAL BOXES. M8.3 ROTOR WEIGHT AND TOTAL MOTOR WEIGHT.					
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M8.4 CHARACTERISTIC CURVES OF THE MOTOR.
M9.0 SIX COPIES OF TESTS CARRIED OUT AS PER CLAUSE NO. 6.0 ON EACH MOTOR SHALL BE FURNISHED TO BHEL FOR SCRUTINY AND APPROVAL. ONLY ON ACCEPTANCE FROM BHEL SIDE, MOTOR CAN BE CONSIDERED SUITABLE FOR DISPATCH.

ANNEXURE-II
DATA TO BE FURNISHED BY BIDDER ALONG WITH
OFFER FOR JACKING OIL PUMP

A1.0 EQUIPMENT AND SERVICES OFFERED

PLEASE STATE WHETHER THE FOLLOWING EQUIPMENT SERVICE AS SPECIFIED IN THE DATA SHEETS ARE OFFERED OR NOT.

- | | | |
|-------------|--|--------|
| A1.1 | PUMP AS PER SPECIFICATION | YES/NO |
| A1.2 | MOTOR/MAKE | YES/NO |
| A1.3 | NECESSARY INSTRUMENTS, TEST CONNECTIONS. | YES/NO |
| A1.4 | BASE PLATE AS PER DRAWING. | YES/NO |
| A1.5 | COMPANION FLANGES | YES/NO |
| A1.6 | SPARE PARTS | YES/NO |
| A1.7 | MAINTENANCE AND SPECIAL ERECTION TOOLS. | YES/NO |
| A1.8 | COMMISSIONING OF THE SET. | YES/NO |
| A1.9 | NO. OF PUMPS OFFERED. | |

A2.0 DESIGN AND PERFORMANCE.

- | | | |
|-------------|---|----------------------|
| A2.1 | DESIGNED CAPACITY OF EACH PUMP. | M ³ /hour |
| A2.2 | NORMAL DISCHARGE PRESSURE | |
| A2.3 | EFFICIENCY | |
| A2.4 | RATED SPEED | |
| A2.5 | PERFORMANCE GUARANTEED WHEN INSTALLED AS PER GIVEN ARRANGEMENT. | YES/NO |
| A2.6 | PUMP b.h.p./Kw AT RATED CAPACITY | |
| A2.7 | MAXIMUM ALLOWABLE SUCTION LIFT (FOR MINIMUM NPSH REQUIRED) | |
| A2.8 | MAXIMUM DISCHARGE PRESSURE FOR WHICH PUMP IS SUITABLE. | |
| A2.9 | PARTY SHALL INFORM THE FILTRATION LEVEL OF THE FLOW MEDIA FOR PROPER FUNCTIONING OF PUMP. | |

A3.0 MATERIAL OF CONSTRUCTION

- | | | |
|--------------------------------|--|--------|
| A3.1 | CASING | |
| A3.2 | DRIVING AND DRIVEN SPINDLE SCREW | |
| A3.3 | BASE PLATE | |
| A3.4 | WEARING RINGS | |
| A3.5 | TYPE OF BEARINGS USED | |
| A3.6 | TYPE OF COUPLING | |
| A3.7 | PACKING | |
| A4.0 <u>CONNECTIONS</u> | | |
| A4.1 | SUCTION SIZE | |
| A4.2 | DISCHARGE SIZE | |
| A5.0 <u>DRAWINGS</u> | | |
| A5.1 | GENERAL ARRANGEMENT AND SECTIONAL DRAWING ENCLOSED WITH OFFER. | YES/NO |

दिनांक एवं हस्ताक्षर
SIGN & DATE

SUPERSEDES INVENTORY

सामग्री सूची संख्या को अधिकृत किया करता

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इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्येक एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।

हस्ताक्षर एवं दिनांक
SIGN & DATE

18/2/14

सामग्री सूची संख्या
INVENTORY NO

D-5134

REV. NO. 13

निर्माणकर्ता WORKED BY	H. GUPTA	<i>H Gupta</i>	8/2/14
जांचकर्ता CHECKED BY	ANUJ JAIN	<i>Anuj Jain</i>	8/2/14



दिनांक एवं हस्ताक्षर
SIGN & DATE

SUPERSEDES
INVENTORY

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21/8/2014

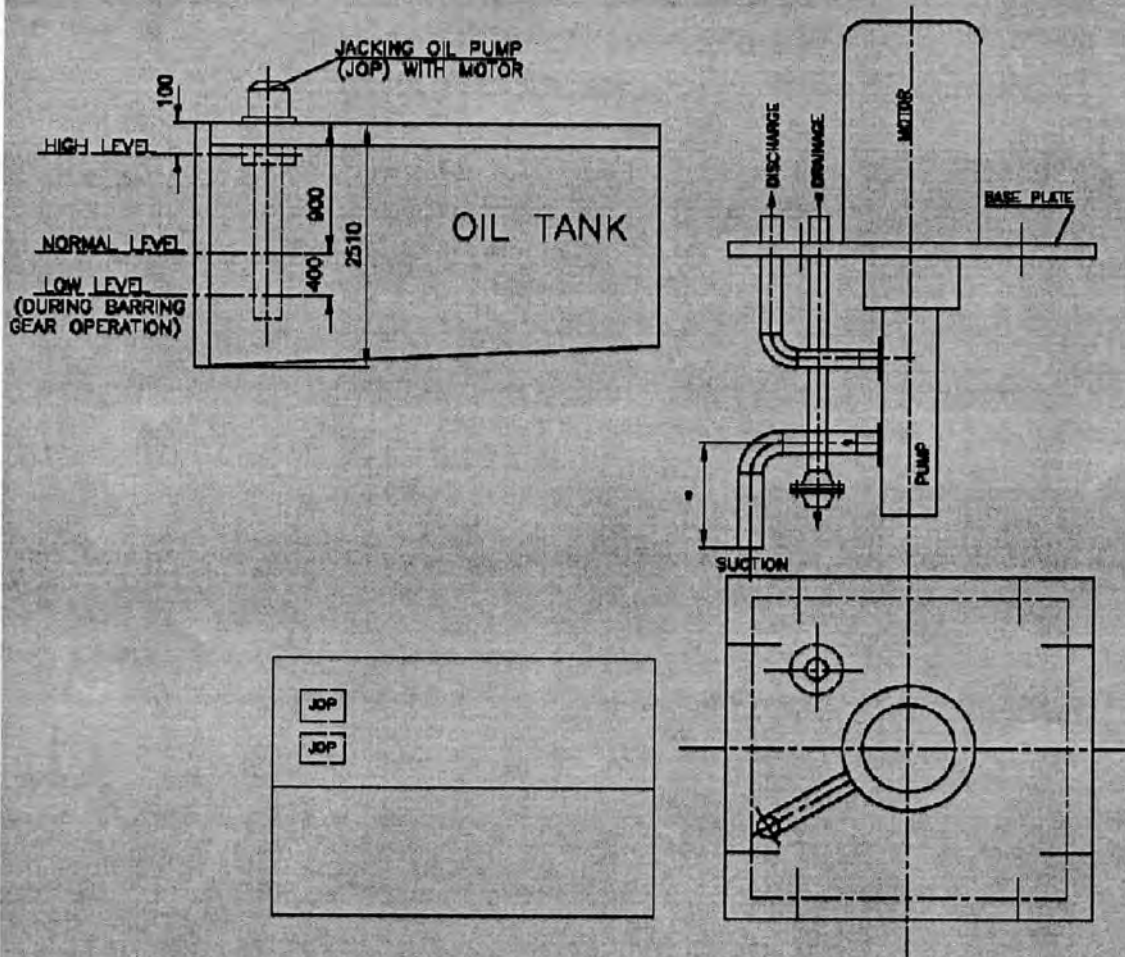
सामग्री सूची संख्या
INVENTORY NO.

R-5134

REV. NO. 13

- A6.0 WEIGHT SCHEDULE**
A6.1 WEIGHT OF PUMP
A6.2 WEIGHT OF MOTOR
A6.3 WEIGHT OF PUMP WITH MOTOR AND BASE FRAME.
A7.0 CHARACTERISTIC CURVES
A7.1 POWER CONSUMPTION / DISCHARGE PRESSURE
A7.2 DISCHARGE QUANTITY / DISCHARGE PRESSURE
A7.3 DISCHARGE QUANTITY / EFFICIENCY
A8.0 ANY DEVIATION TAKEN AGAINST SPECIFICATION. YES/NO
A9.0 DEVIATIONS TAKEN AS MENTIONED HERE
A10.0 HYDRAULIC TEST PRESSURE

OIL TANK ARRANGEMENT

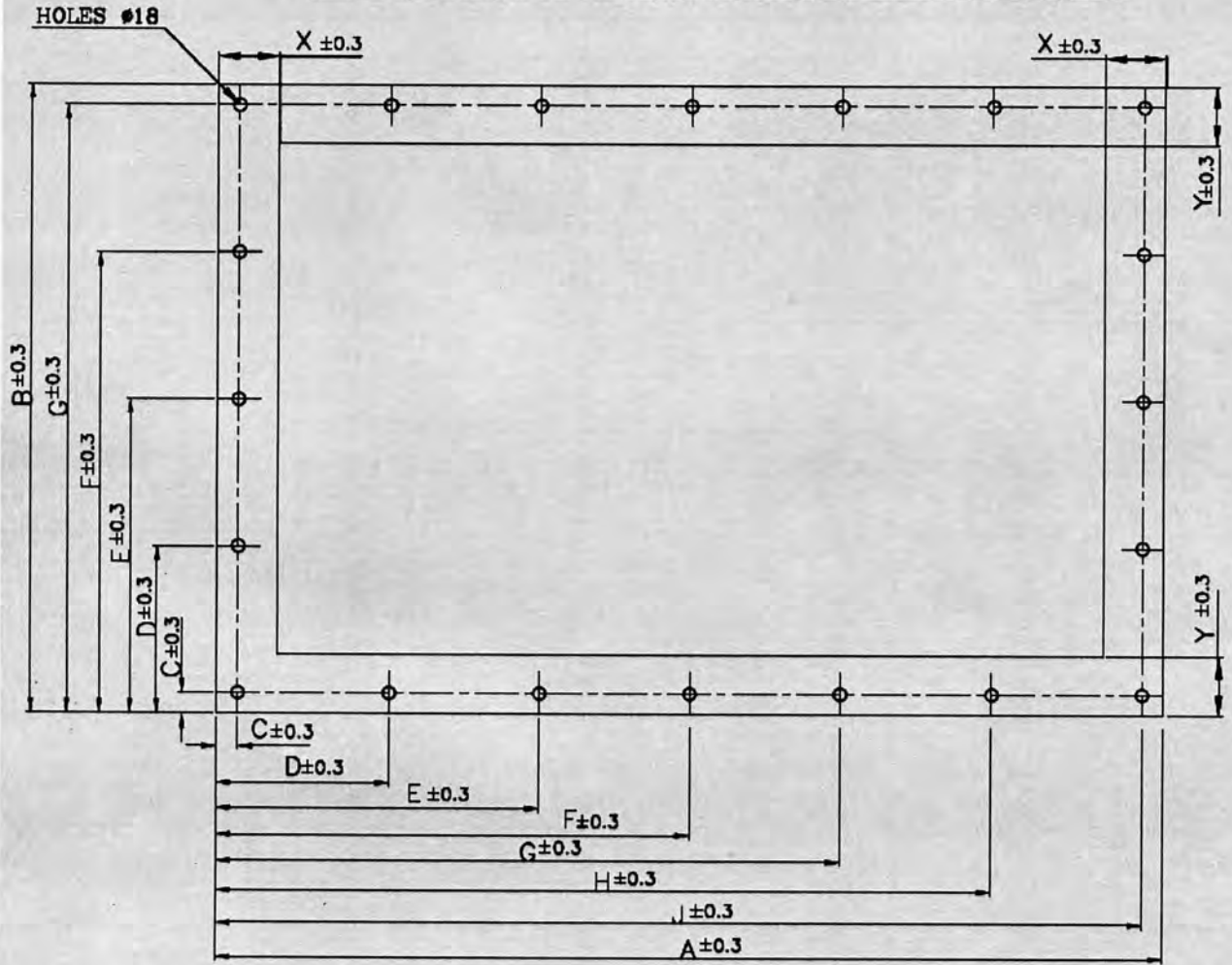


* LENGTH MAY BE KEPT SO AS TO MEET THE PUMP DESIGN REQUIREMENT SUITING TO MIN OIL LEVEL IN TANK.

निर्माणकर्ता WORKED BY	H. GUPTA	Hgupta	8/2/14
जांचकर्ता CHECKED BY	ANUJ JAIN	AJain	8/2/14



BED PLATE EXISTING ON OIL TANK



BED PLATE TYPE	A±0.3	B±0.3	C±0.3	D±0.3	E±0.3	F±0.3	G±0.3	H±0.3	J±0.3	X±0.3	Y±0.3	NO. OFF HOLES
AA	700	700	50	250	450	650	-	-	-	80	80	12
BB	700	700	35	245	455	665	-	-	-	60	60	12
CC	1320	900	30	240	450	660	870	1080	1290	85	85	20

Note:- Bed Plate type "AA" to be supplied unless otherwise specified in tender.
CROSS REFERRED STANDARDS: IS:325, IS:2253, IS:2254, IS:3202, IS:4027, IS 12615:2011
IS:4722, IS:12065, IS:12075, VDMA:24284.

दिनांक एवं हस्ताक्षर
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SUPERSEDES INVENTORY

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INVENTORY NO

REV. NO. 13

निर्माणकर्ता WORKED BY	H. GUPTA	Hgmr	8/2/14
जांचकर्ता CHECKED BY	ANUJ JAIN	Ajain	8/2/14



उत्पाद मानक

ST-39007

PRODUCT STANDARD
(STEAM TURBINE ENGINEERING)

पृष्ठ 14 का 1

Page 1 of 14

TECHNICAL SPECIFICATION FOR
JACKING OIL PUMP SET (D.C.)

1.0 INTENT OF SPECIFICATION:-

THIS SPECIFICATION IS INTENDED TO COVER DESIGN, MANUFACTURE, ASSEMBLY, TESTING AND SUPPLY OF COMPLETE PUMPING SETS ALONG WITH BASE PLATE, ANCHOR BOLTS, LIFTING LUGS, COUPLING, SUCTION PIPE, SUCTION FILTER, STARTUP VALVE (IF REQUIRED BY VENDOR FROM PUMP SAFETY POINT OF VIEW) AND OTHER ACCESSORIES INCLUDING MOTOR AND THEIR COMMISSIONING AT POWER STATION.

THE PUMPING SETS ARE INTENDED FOR OPERATION IN CONJUNCTION WITH STEAM TURBINES AND SHOULD BE SUITABLE FOR CONTINUOUS OPERATION AT AN AMBIENT TEMPERATURE OF 50°C + 90% HUMIDITY.

2.0 FUNCTION:-

JACKING OIL PUMP COMES IN OPERATION IN CONJUNCTION WITH THE BARRING OPERATION OF THE TURBINE.

3.0 APPLICABLE CODE/STANDARD:-

IS:4722, VDMA 24284, IS: 2253, IS: 2254, IS: 3202
IS: 12075

4.0 OIL SPECIFICATION:-

THE MEDIUM HANDELED IS TURBINE OIL OF VISCOSITY CLASS ISO VG46. THE OIL CAN BE SERVO PRIME 46 OF INDIAN OIL CORPORATION OR TURBOL 46 OF BHARAT PETROLEUM OR SHELL TURBOL 46 OF BHARAT SHELL LTD.

KINEMATIC VISCOSITY AT 65°C/20°C : 16 cs/100 cs
SPECIFIC GRAVITY AT 65°C : 0.8488
FLASH POINT : 200°C (min)
OPERATIONAL TEMPERATURE : 65°C
POUR POINT : -6.6°C (max.)

5.0 PUMP SPECIFICATION:-

5.1 IDENTIFICATION NO. TO BE MENTIONED ON NAME PLATE AS FOLLOWS:-
MAV 32 AP001

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CIE	Nirbhay Kumar	अनुवादक TRANSLATED BY
QAX	Vibhuti Shah	निर्माणकर्ता WORKED BY
TSX	B.Choudhary	जांचकर्ता CHECKED BY
सहमत विभाग AGREED DEPTT.	नाम NAME	पर्यवेक्षणकर्ता SUPERVISED BY
	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	ANUJ JAIN
	स्वीकृति APPROVED :	(A.B.GUPTA) AGM
REV.NO. 12	SUPERSEDES	निर्माण : PREPARED : PED
Dt. 28-01-14		जारी : ISSUED : TSX

SUPERSEDES INVENTORY NO.
 सामग्री सूची संख्या को अधिकारित करता है

5.2 TYPE : SCREW/VANE TYPE POSITIVE DISPLACEMENT

DESIGN TEMPERATURE = 100°C , OPERATING TEMPERATURE = 65°C

VARIANT NUMBER	NORMAL DISCHARGE CAPACITY (Litre/Min.)	NORMAL DISCHARGE PRESSURE (Bar)
VAR. 1	1.26	120
VAR. 2	1.80	140
VAR. 3	1.68	189
VAR. 4	1.25	182
VAR. 5	2.25	182
VAR. 6	1.53	178
VAR. 7	1.33	182
VAR. 8	1.27	182
VAR. 9	1.84	178

VARIANT NUMBER	NORMAL DISCHARGE CAPACITY (Litre/Min.)	NORMAL DISCHARGE PRESSURE (Bar)
VAR. 10	1.70	175
VAR. 11	1.30	155

PUMP SHALL BE SUITABLE FOR MOUNTING VERTICALLY ON THE OIL TANK. BASE PLATE OF PUMP SHALL MATCH THE COUNTER FLANGE PROVIDED ON THE TANK AS PER SKETCH ON PAGE 14. SMOOTH FUNCTIONING IS ENSURED BY MAINTAINING OIL LEVELS AS DEPICTED IN THE ARRANGEMENT ON PAGE NO. 13.

- 5.3** DURING INITIAL START UP IN WINTER, OIL TEMPERATURE MAY GO AS BELOW AS 20°C.
- 6.0 MOTOR:-**
A SUITABLE MOTOR CONFORMING TO THE PUMP REQUIREMENTS SHALL BE SUPPLIED. FOR DETAILS ON MOTOR, REFER ANNEXURE-I ON PAGE NO.8.

7.0 DESIGN AND CONSTRUCTION OF PUMP:-
ALL MATERIALS USED IN THE CONSTRUCTION OF THE PUMPS SHALL BE SELECTED FROM THE RANGE OF MATERIAL MOST APPROPRIATELY SUITABLE FOR THE PURPOSE AND SERVICE CONDITIONS. THE BIDDER SHALL FURNISH MATERIAL SPECIFICATION FOR ALL THE COMPONENTS ALONG WITH THE OFFER TO BHEL FOR THEIR REVIEW AND ACCEPTANCE BY BHEL/ITS CUSTOMER. BHEL/ITS CUSTOMER RESERVES THE RIGHT TO ASK FOR CHANGES IN MATERIAL. THE SIZE SHALL BE STANDARDISED SO AS TO ENSURE INTERCHANGEABILITY.

THE SUCTION, DISCHARGE AND DRAINAGE SIZES AND TYPE OF CONNECTIONS.
 SUCTION- $\phi 60.3 \times 4$ TYPE OF CONNECTION BUTT WELDED.
 DISCHARGE- $\phi 33.4 \times 4.5$ TYPE OF CONNECTION BUTT WELDED.
 DRAINAGE INLET- $\phi 33.4 \times 3.4$ TYPE OF CONNECTION BUTT WELDED.
 DRAINAGE OUTLET- $\phi 33.4 \times 3.4$ TYPE OF CONNECTION BUTT WELDED (FLANGED CONNECTION DIN: 2633 IS TO BE SUPPLIED WITH COUNTER FLANGE, O'RING, BOLTS, NUTS AND WASHER).

7.1 SPECIAL TOOLS AND TACKLES
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.

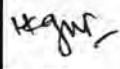

7.2 THE MATERIALS OF CONSTRUCTION OF THE PUMPS SHALL BE SUCH AS TO RESIST CORROSION AND EROSION AND SHALL GIVE A LONG TROUBLE FREE SERVICE.


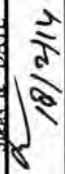
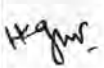

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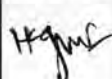

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हस्ताक्षर एवं दिनांक
SIGN DATE
 18/2/14

सामग्री सूची संख्या
INVENTORY NO.
 1-5474

REV. NO. 12		निर्माणकर्ता WORKED BY	H.GUPTA		8/2/14
		जांचकर्ता CHECKED BY	ANUJ JAIN		8/2/14

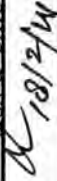
दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD (STEAM TURBINE ENGINEERING)	ST-39007 पृष्ठ 14 का 3 Page 3 of 14			
सामग्री सूची संख्या को अधिकांशित करना	SUPERSEDES INVENTORY	<p>7.3 THE SUPPLIER SHALL ALSO FURNISH THE METHOD AND FREQUENCY OF LUBRICATION OF THE BEARINGS AND QUANTITY AND TYPE OF LUBRICANT REQUIRED FOR NORMAL OPERATION. BUT LUBRICATION OF BEARINGS WITH THE OIL BEING HANDLED IS PREFERRED.</p> <p>7.4 THE DESIGN SHALL BE SUCH AS TO KEEP THE FRICTIONAL LOSS AND WEAR CAUSED BY END THRUST TO THE MINIMUM. IT WILL ALSO ENSURE MINIMUM WEAR AND CAVITATION IN MECHANICAL SEALS AND BEARINGS. LONG AND TROUBLE FREE SERVICE SHALL BE ENSURED. THE ROTORS OF THE PUMP SHOULD BE DESIGNED IN SUCH A WAY SO THAT MINIMUM VIBRATIONS ARE EXPERIENCED. THE SOUND PRESSURE LEVEL OF PUMP MOTOR SET SHOULD NOT BE GREATER THAN 85 dBA TO A REFERENCE OF 0.0002 MICRO BAR WHEN MEASURED AT A DISTANCE OF 1.5 METERS ABOVE FLOOR LEVEL AND ONE METERS HORIZONTALLY FROM THE BASE OF THE EQUIPMENT AND VIBRATIONS ARE IN THE PERMISSIBLE RANGE AS PER VDI 2056.</p> <p>7.5 SEALS MUST COMPLY WITH THE FOLLOWING PROPERTIES:</p> <p>(a) READY ACCESS AND AMENABILITY FOR MAINTENANCE WORK. (b) NO CONTAMINATION OF THE MEDIUM FROM MATERIAL ABRADED FROM THE SEALS. (c) NO SEEPAGE OF LUBRICANTS INTO THE FLOW MEDIUM. (d) MINIMUM LEAKAGE LOSSES WITH THEIR CONTROLLED REMOVAL.</p> <p>7.6 TO FACILITATE TRANSPORT AND ERECTION, LIFTING HOOKS OR ERECTION EYES SHALL BE FITTED AT SUITABLE POINTS ON THE COMPONENTS. THEIR LOCATIONS MUST BE SHOWN ON THE DIMENSIONAL DRAWING.</p> <p>7.7 PUMP BEARINGS SHALL BE DESIGNED SO AS TO ASSURE 50,000 hrs CONTINUOUS SERVICE FOR FRICTION BEARINGS AND 30,000 hrs FOR BALL AND ROLLER BEARINGS.</p> <p>7.8 THE MECHANICAL DESIGN SHALL ALLOW EASY ACCESS TO VARIOUS PARTS FOR CARRYING OUT MAINTENANCE WORK.</p> <p>7.9 THE DISCHARGE BRANCH OF THE PUMP SHALL BE TAKEN OUT 100 MM ABOVE THE BASE PLATE BY THE SUPPLIER.</p> <p>7.10 THE PUMPS SHALL BE PROVIDED WITH DRAINAGE AND VENTING DEVICES.</p> <p>7.11 ALL SYSTEM PARTS CARRYING OIL SHALL BE OF OIL TIGHT CONSTRUCTION, COMPRESSION-TYPE FITTINGS ARE NOT PERMISSIBLE.</p> <p>7.12 FOR SCREW/VANE PUMPS RUNNING AT SUBCRITICAL SPEEDS, IT SHALL BE ENSURED THAT THE CRITICAL SPEED LIES ABOVE THE MAXIMUM SPEED ATTAINABLE DURING OPERATION WITH A MINIMUM MARGIN ON 15% OF RATED SPEED. FOR PUMPS RUNNING AT SUPER CRITICAL SPEEDS, IT SHALL BE ENSURED THAT THERE IS A DIFFERENCE OF SUFFICIENT MAGNITUDE (NOT LESS THAN 20%) BETWEEN THE OPERATING SPEED AND THE BORDER IN CRITICAL SPEEDS. ALLOWANCES SHALL BE MADE FOR THE TYPE OF COUPLING BETWEEN THE PUMP AND MOTOR WHILE CALCULATING THE CRITICAL SPEEDS.</p>				
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दिनांक एवं हस्ताक्षर SIGN & DATE						
सामग्री सूची संख्या INVENTORY NO	REV. NO. 12		निर्माणकर्ता WORKED BY	H.GUPTA		8/2/14
P-5474			जांचकर्ता CHECKED BY	ANUJ JAIN		8/2/14

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD (STEAM TURBINE ENGINEERING)	ST-39007 पृष्ठ 14 का 4 Page 4 of 14			
सामग्री सूची संख्या को अधिष्ठापित करना	SUPERSEDES INVENTORY	<p>7.13 COUPLING SUITABLE COUPLING WITH GUARDS SHALL BE PROVIDED FOR COUPLING PUMP WITH MOTOR. IT SHALL BE DESIGNED TO FACILITATE EASY ALIGNMENT. ONE SET OF COUPLING BOLTS SHALL BE SUPPLIED IN SPARE. COUPLING BETWEEN PUMP AND MOTOR SHOULD BE SUITABLE FOR LIFTING THE MOTOR WITH OR WITHOUT LIFTING COMPLETE ASSEMBLY WITH PUMP.</p> <p>7.14 FOUNDATION THE PUMP SHALL BE MOUNTED ON THE OIL TANK AND HUNG FROM BED PLATE AT THE TANK TOP INTO THE TANK. FOR FURTHER DETAILS REFER PAGE NO. 13 & 14. ALL THE SEATING MACHINED SURFACES OF BED PLATE TO BE MAINTAINED FOR 0.5 mm FLATNESS.</p> <p>8.0 QUALITY ASSURANCE, INSPECTION AND TESTING</p> <p>(a) THE MANUFACTURER SHALL CONDUCT ALL TESTS REQUIRED TO ENSURE ALL THE COMPONENTS/PART OF THE JACKING OIL PUMP OFFERED, CONFORM TO THE REQUIREMENTS OF THE SPECIFICATION AND IN COMPLIANCE WITH REQUIREMENTS OF APPLICABLE CODES AND STANDARDS.</p> <p>(b) THE BIDDER SHALL SUBMIT ALONG WITH HIS OFFER QUALITY PLAN.</p> <p>8.0.1 THE TESTING MEDIUM SHALL BE TURBINE OIL (AS SPECIFIED IN POINT NO.4 AT PAGE NO.1).</p> <p>8.1 THE PARTICULARS OF THE PROPOSED SHOP TESTS AND PROCEDURES FOR THE TESTS SHALL BE SUBMITTED TO BHEL / ITS CUSTOMER FOR APPROVAL ALONGWITH QUALITY PLAN.</p> <p>8.2 THE MATERIAL SHALL BE DISPATCHED ONLY AFTER INSPECTION AND CLEARANCE OF MATERIAL BY BHEL OR ITS CUSTOMER AND APPROVAL OF TEST CERTIFICATE BY BHEL / ITS CUSTOMER.</p> <p>8.3 THE MINIMUM TESTS/ CHECKS TO BE CARRIED OUT ON THE JACKING OIL 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 AND BHEL / ITS CUSTOMER RESERVES THE RIGHT TO ASK FOR ANY MORE CHECKS AT THE TIME OF QUALITY PLAN FINALIZATION.</p> <p>8.3.1 TESTING OF MATERIALS</p> <p>THE MATERIAL OF EACH COMPONENT SHALL BE TESTED AS PER RELEVANT SPECIFICATION FOR ITS CHEMICAL COMPOSITION AND MECHANICAL PROPERTIES, VIZ. YS, UTS, IMPACT, % ELONGATION % RA ETC. NDT, UT ON SHAFT, MPI ON SCREW/VANES & CASING SHALL BE CARRIED OUT TO ENSURE FREEDOM FROM SURFACE AND SUB-SURFACE DEFECTS.</p> <p>8.3.2 FOLLOWING TESTS SHALL BE CARRIED OUT DURING VARIOUS STAGES OF MANUFACTURE AT MANUFACTURER WORKS.</p> <p>(a) CHECK FOR DIMENSIONS OF ALL COMPONENT PARTS INCLUDING SURFACE FINISH, AXIAL AND RADIAL RUN OUT OF SHAFT ETC.</p> <p>(b) NON-DESTRUCTIVE EXAMINATION: UT FOR SCREW /VANES BLANKS AND DPT/MPI ON SCREWS/VANES TO BE CARRIED OUT TO ENSURE SURFACE/SUB-SURFACE DEFECTS.</p>				
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सामग्री सूची संख्या INVENTORY NO.	REV. NO. 12		निर्माणकर्ता WORKED BY	H.GUPTA		8/2/14
P-5474			जांचकर्ता CHECKED BY	ANUJ JAIN		6/2/14

सामग्री सूची संख्या को अभिलेखित करना
 SUPERSEDES INVENTORY



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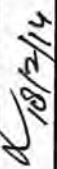


स्वत्वाधिकार एवं गोपनीय
 इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।


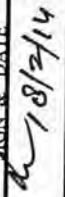


हस्ताक्षर एवं दिनांक
SIGN & DATE





सामग्री सूची संख्या
INVENTORY NO.
 P-5474


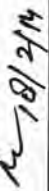



- (c) CHECK THE CONDITION OF THE OIL SEALS AND ANY SEEPAGE OF OIL THROUGH SEALS ETC.
 - (d) HYDRAULIC TESTING OF THE CASING AND OTHER PRESSURE PARTS SHALL BE AS PER VDMA 24284.
 - (e) PERFORMANCE TEST WITH CALIBRATED TEST BED MOTOR FOR VERIFICATION OF PUMP CHARACTERISTICS, VIZ. DISCHARGE AT THE GIVEN PRESSURE SCHEDULE OF POWER CONSUMPTION AS PER VDMA 24284, NOISE AND VIBRATION LEVEL AS PER VDI 2056.
 - (f) STRIP DOWN TEST TO CHECK THE CONDITION OF BEARING, MECHANICAL CLEARANCES, AND AXIAL PLAY OF SHAFT ETC.
- 8.3.3** 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 SAFEGAURD AGAINST ANY DAMAGE DURING TRANSIT AND IS SAFE FOR TWO YEARS IN A VERY DAMP ATMOSPHERE.
- 8.3.4** TEST CERTIFICATES INDICATING THE ACTUAL TEST RESULTS OF MATERIAL TESTING, NDT, HYDRAULIC TEST, PERFORMANCE TEST, STRIP DOWN EXAMINATION Etc. SHALL BE FURNISHED.
- 9.0** **PRE-APPROVAL DOCUMENTS AT THE TIME OF OFFER**
- 9.1** ASSEMBLY DRAWING WITH PART LISTS, NOZZLE SIZES AND THEIR COORDINATES, BASE PLATE DETAILS AND CROSS SECTION ARRANGEMENT ALONG WITH STATIC LOADING.
- 9.2** CALCULATIONS WITH NECESSARY DRAWINGS (TORQUE/SPEED CHARACTERISTICS Etc), POWER REQUIREMENTS, TORQUE SETTING VALUE FOR MOTOR TRIP, PERMISSIBLE TORQUE VALUE FOR KEY AND POWER SHAFT.
- 9.3** MAXIMUM MAGNETIC AND NON-MAGNETIC PARTICLE SIZE, WHICH CAN PASS THOROUGH PUMP SCREW/VANE LY CLEARANCE WITHOUT DAMAGING THE PUMP SHALL BE SPECIFIED IN THE OFFER.
- 9.4** QUALITY PLAN WITH DETAILS OF QUALITY LEVELS AND MANUFACTURING TOLERANCES. THIS SHOULD GENERALLY CONFORM TO VDMA 24284. GENERALLY ACCELTED PRACTICES, IN PARTICULAR VDMA CODES AND STANDARDS OR EQUIVALENT SHALL BE APPLIED AND TAKEN INTO ACCOUNT FOR DESIGN OF SCREW/VANE PUMPS. THE CODES OF STANDARDS APPLIED IN EACH CASE SHALL BE SPCIFIED IN THE OFFER.
- 9.5** FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE-I. EXAMINATION OF THE PRE-APPROVED DOCUMENTS BY BHEL SHALL NOT RELIEVE THE MANUFACTURER AND HIS SUBCONTRACTORS OF THEIR RESPONSIBILITIES. THE PRE-APPROVED DOCUMENTS SHALL FORM THE BASIS FOR THE ORDER. NO CHANGES SHALL BE MADE WITHOUT APPROVAL FROM BHEL.


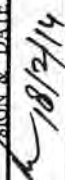


REV. NO. 12		निर्माणकर्ता WORKED BY	H.GUPTA		8/2/14
		जांचकर्ता CHECKED BY	ANUJ JAIN		8/2/14


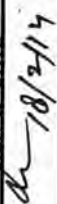

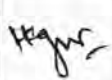

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD (STEAM TURBINE ENGINEERING)	ST-39007 पृष्ठ 14 का 6 Page 6 of 14																														
सामग्री सूची संख्या को अधिकांशित करना SUPERSEDES INVENTORY	<p>10.0 DOCUMENTS TO BE SUPPLIED AFTER THE PLACEMENT OF ORDER:</p> <p>THESE SHALL BE SUPPLIED IN SOFT COPY VIA MAIL OR BY CD AS PER FOLLOWING SCHEDULE:</p> <table border="0"> <tr> <td>10.1 CONTRACTUAL DRAWINGS</td> <td>- 4 WEEKS</td> </tr> <tr> <td>10.2 OVERHAUL AND SPARE PARTS LISTS</td> <td>- 4 WEEKS</td> </tr> <tr> <td>10.3 EQUIPMENT DESCRIPTION</td> <td>- 4 WEEKS</td> </tr> <tr> <td>10.4 TEST CERTIFICATE OF ALL TESTS AS PER QUALITY PLAN, DRAWINGS DURING VARIOUS STAGES OF MANUFACTURE. ALSO REFER CLAUSE 8.2 AND 8.3.4 ABOVE.</td> <td>- BEFORE DESPATCH</td> </tr> <tr> <td>10.5 LIST OF TOOLS AND TACKLES</td> <td>- 4 WEEKS</td> </tr> <tr> <td>10.6 THE STATIC AND DYNAMIC LOADING DETAILS ON SUPPORT/FOUNDATION SHOULD BE FURNISHED.</td> <td>- 4 WEEKS</td> </tr> <tr> <td>10.7 FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE I ON PAGE NO.8.</td> <td></td> </tr> <tr> <td>10.8 O & M MANUALS (10 HARD COPIES+2CD)</td> <td>- 8 WEEKS</td> </tr> </table> <p>11.0 NAME PLATE IDENTIFICATION MARKINGS SHOULD BE AS FOLLOWS:</p> <table border="0"> <tr><td>11.1 TYPE / DESIGNATION</td></tr> <tr><td>11.2 MANUFACTURER</td></tr> <tr><td>11.3 MANUFACTURER'S WORKS NO.</td></tr> <tr><td>11.4 YEAR OF MANUFACTURING</td></tr> <tr><td>11.5 PURCHASER'S ORDER NO.</td></tr> <tr><td>11.6 VOLUMETRIC FLOW (l/m)</td></tr> <tr><td>11.7 DISCHARGE PRESSURE (Bar/MWC)</td></tr> <tr><td>11.8 OPERATING TEMPERATURE (°C)</td></tr> <tr><td>11.9 FLOW MEDIUM.</td></tr> <tr><td>11.10 SPEED.</td></tr> <tr><td>11.11 BILINGUAL IN HINDI AND ENGLISH LANGUAGES.</td></tr> <tr><td>11.12 THE PUMP DATA SHEETS, GA DRAWING, CHARACTERISTIC CURVES, AND CROSS SECTIONAL DRAWING SHALL BE REQUIRED TO BE APPROVED BY BHEL/BHEL's CUSTOMER/ CUSTOMER'S CONSULTANT.</td></tr> <tr><td>11.13 KKS IDENTIFICATION i.e. MAV32AP001.</td></tr> </table>				10.1 CONTRACTUAL DRAWINGS	- 4 WEEKS	10.2 OVERHAUL AND SPARE PARTS LISTS	- 4 WEEKS	10.3 EQUIPMENT DESCRIPTION	- 4 WEEKS	10.4 TEST CERTIFICATE OF ALL TESTS AS PER QUALITY PLAN, DRAWINGS DURING VARIOUS STAGES OF MANUFACTURE. ALSO REFER CLAUSE 8.2 AND 8.3.4 ABOVE.	- BEFORE DESPATCH	10.5 LIST OF TOOLS AND TACKLES	- 4 WEEKS	10.6 THE STATIC AND DYNAMIC LOADING DETAILS ON SUPPORT/FOUNDATION SHOULD BE FURNISHED.	- 4 WEEKS	10.7 FOR DOCUMENTATION ON MOTOR, PLEASE REFER ANNEXURE I ON PAGE NO.8.		10.8 O & M MANUALS (10 HARD COPIES+2CD)	- 8 WEEKS	11.1 TYPE / DESIGNATION	11.2 MANUFACTURER	11.3 MANUFACTURER'S WORKS NO.	11.4 YEAR OF MANUFACTURING	11.5 PURCHASER'S ORDER NO.	11.6 VOLUMETRIC FLOW (l/m)	11.7 DISCHARGE PRESSURE (Bar/MWC)	11.8 OPERATING TEMPERATURE (°C)	11.9 FLOW MEDIUM.	11.10 SPEED.	11.11 BILINGUAL IN HINDI AND ENGLISH LANGUAGES.	11.12 THE PUMP DATA SHEETS, GA DRAWING, CHARACTERISTIC CURVES, AND CROSS SECTIONAL DRAWING SHALL BE REQUIRED TO BE APPROVED BY BHEL/BHEL's CUSTOMER/ CUSTOMER'S CONSULTANT.	11.13 KKS IDENTIFICATION i.e. MAV32AP001.
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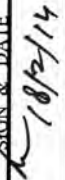
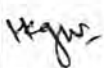

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD (STEAM TURBINE ENGINEERING)	ST-39007 पृष्ठ 14 का 7 Page 7 of 14				
सामग्री सूची संख्या को अधिकतम करता	SUPERSEDES INVENTORY NO.	<p>12.0 <u>CLEANING, PAINTING, CONSERVATION & PACKING:</u></p> <p>THE SURFACE SHALL BE CLEANED & PREPARED FOR APPLICATION OF THE COATINGS BY BLASTING WITH NON-SILICATIC ABBRASIVE AGENTS. THE PROTECTIVE COATING SHOULD BE OIL RESISTANT TO PREVENT COTAMINATION OF OIL SPECIFIED TO PREVENT THE DETERIORATION OF THE COATING ITSELF. THE SUPPLIER SHALL GIVE EXACT AND PRECISE DETAILS ABOUT THE MEASURES ENVISAGED BY HIM FOR SURFACE PROTECTION, WHICH SHALL BE CHECKD AND APPROVED BY BHEL.</p> <p>INSTRUCTIONS SHOULD BE ISSUED REGARDING RECONSERVATION, DECONSERVATION ALONGWITH SPECIFICATION OF MATERIAL TO BE USED FOR ABOVE PURPOSE. 100% QUANTITY OF COATING MATERIAL SHALL BE SUPPLIED ALONG WITH THE PUMP FOR RECONSERVATION AND DECONSERVATION AT SITE DURING STORAGE. ANY SPECIFIC INSTRUCTION TO BE FOLLOWED DURING STORAGE AT SITE TO AVOID ANY SEIZING ETC SHALL ALSO BE INTIMATED. ALL SUCH INSTRUCTIONS SHALL BE MADE AVAILABLE TO SITE INCHARGE IN A SEPARATE COVER (NOT PACKED WITH PUMP PACKAGE). THE SUPPLIER SHALL BE RESPONSIBLE FOR ALL LOSS OR DAMAGE DURING TRANSPORTATION, HANDLING AND STORAGE DUE TO IMPROPER PACKING.</p>					
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हस्ताक्षर एवं दिनांक SIGN & DATE	 18/12/14						
सामग्री सूची संख्या INVENTORY NO.	P-5474	REV. NO. 12		निर्माणकर्ता WORKED BY	H.GUPTA		8/2/14
				जांचकर्ता CHECKED BY	ANUJ JAIN		8/2/14

दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;">उत्पाद मानक</p> <p style="text-align: center;">PRODUCT STANDARD (STEAM TURBINE ENGINEERING)</p>	<p style="text-align: right;">ST-39007</p> <p style="text-align: right;">पृष्ठ 14 का 8 Page 8 of 14</p>			
सामग्री सूची संख्या को अधिकारित करता	SUPERSEDES INVENTORY	<p>14.0.4 THE SUPPLIER SHALL REPAIR / REPLACE THE DEFECTIVE PARTS AT HIS OWN COST DURING THE GUARANTEE PERIOD.</p> <p>15.0 SPARES THE SUPPLIER SHALL QUOTE ITEM WISE PRICE OF RECOMMENDED SPARES FOR 3 EARS AND 5 YEARS OPERATION RESPECTIVELY.</p> <p style="text-align: center;"><u>ANNEXURE - I</u> <u>SPECIFICATION OF D.C. MOTOR FOR JACKING OIL PUMP</u></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.	<p>M1.0 A SUITABLE MOTOR CONFORMING TO THE JACKING OIL PUMP REQUIREMENT SHALL BE SUPPLIED. THE MOTOR SHALL CONFORM TO IS: 4722, IS: 2253, IS: 2254, IS:3202, EQUIVALENT. BS SPECIFICATION. THE MOTOR SHALL MEET ALL INDIAN STATUTORY REQUIREMENTS.</p> <p>M2.0 APPLICATION TO DRIVE OIL PUMP FOR SUPPLYING OIL FOR LIFTING THE SHAFT IN THE BEARINGS.</p> <p>M2.0 TYPE OF MOTOR: SEPARATELY EXCITED OR COMPOUND MOTOR WITH 10% COMPOUNDING.</p> <p>M3.1 KW RATING: IT SHALL HAVE AT LEAST 15% RESERVE CAPACITY THAN REQUIRED TO DRIVE THE PUMP WHEN IT IS DISCHARGING MAXIMUM QUANTITY.</p> <p>M3.2 KW ACTUALLY REQUIRED BY DRIVE EQUIPMENT : PUMP CAPACITY UNDER SPECIFIED OPERATING AND START UP CONDITIONS.</p> <p>M3.3 RATED VOLTAGE : 220 V D.C. : 220 V D.C. FIELD</p> <p>M3.4 PERMISSIBLE VOLTAGE VARIATIONS UNDER NORMAL RUNNING CONDITIONS. : -15% +10%</p> <p>M3.5 MINIMUM VOLTAGE REQUIRED UNDER STARTING : 80% RATED CONDITIONS TO BRING DRIVEN EQUIPMENT UPTO RATED SPEED.</p> <p>M3.6 TYPE OF DUTY : CONTINUOUS</p> <p>M3.7 FULL LOAD SPEED : IT SHALL BE COMMENSURAT WITH PUMP SPEED AS PER DESIGN.</p> <p>M3.8 FULL LOAD CURRENT : AS PER DESIGN</p> <p>M3.9 STARTING CURRENT : 2 TIMES CURRENT AT RATED VOLTS.</p> <p>M3.10 STARTING TORQUE : 2 TIMES TORQUE AT RATED VOLTS.</p> <p>M3.11 EFFICIENCY AT FULL LOAD : 85% (minimum)</p>					
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दिनांक एवं हस्ताक्षर SIGN & DATE	8/2/14	REV. NO. 12	निर्माणकर्ता WORKED BY	H.GUPTA		8/2/14
सामग्री सूची संख्या INVENTORY NO.	P-5474		जांचकर्ता CHECKED BY	ANUJ JAIN		8/2/14

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD (STEAM TURBINE ENGINEERING)	ST-39007			
सामग्री सूची संख्या INVENTORY NO.	सामग्री सूची संख्या को अधिकारित करता	<p>M4.2 PERMISSIBLE STARTING DUTY CYCLE/ NO. OF STARTS. : 3 STARTS SPREAD OVER AN HOUR TWO CONSECUTIVE STARTS.</p> <p>M4.3 STARTING RESISTANCE BOX/PANEL SHALL BE IN VENDOR'S SCOPE OF SUPPLY AND SHALL BE SOURCED FROM THE MOTOR SUPPLIER.</p> <p>M4.4 OVERLOAD (% OF FULL LOAD) THAT CAN BE CARRIED BY MOTOR IMPAIRING, OVERALL PERFORMANCE AND PERIOD FOR WHICH THIS OVERLOAD IS APPLICABLE. : 25% FOR 5 MINUTES.</p> <p>M4.5 LOCATION : TURBINE HALL-INDOOR</p> <p>M4.6 CLASS OF INSULATION : CLASS F, FUNGUS RESISTANT, TROPICALISED AS PER IS:3202, WITH TEMPERATURE RISE LIMITED TO THAT OF CLASS B.</p> <p>M4.7 WINDING TEMP. DETECTORS : TO BE PROVIDED.</p> <p>M4.8 <u>MECHANICAL CONSTRUCTION:-</u></p> <p>M4.8.1 SHAFT DISPOSITION/MOUNTING : VERTICAL/FLANGE MOUNTED</p> <p>M4.8.2 METHOD OF CONNECTION TO DRIVEN EQUIPMENT. : FLANGE FLEXIBLE COUPLING.</p> <p>M4.8.3 DIRECTION OF ROTATION AND CORRESPONDING TERMINAL DESIGNATION. : TO SUIT PUMP</p> <p>M4.8.4 ENCLOSURE AND VENTILATION : TOTALLY ENCLOSED FAN COOLED IP-55.</p> <p>M4.8.5 BEARING : THRUST BEARING, MINIMUM STANDARD LIFE NOT LESS THAN 30000 WORKING HOURS.</p> <p>M4.8.6 GROUNDING DEVICE : SUITABLE ARRANGEMENT SHALL BE PROVIDED FOR EARTHING THE MOTOR AT TWO SEPARATE AND DISTINCT CONNECTION POINTS. DESIGN OF EARTHING CONDUCTOR SHALL BE AS PER IS: 4722.</p> <p>M4.8.7 TERMINAL CONNECTORS : 2 FOR ARMATURE, 2 FOR FIELD.</p> <p>M4.9 TERMINAL BOX : TERMINAL BOX SHALL BE PROVIDED WITH DOUBLE COMPRESSION TYPE BRASS CABLE GLANDS (Nickel Chromium PLATED HEAVY DUTY, CONFIRMING TO BS:6121) AND COPPER CABLE LUGS TO MATCH OWNER'S ALUMINUM CABLES, THE SIZE OF WITCH SHALL BE INTIMATED LATER. TERMINAL BOX SHALL BE CAPABLE OF BEING ROTATED THROUGH 180° IN STEPS OF 90°. IT SHALL HAVE A DEGREE OF PROTECTION OF IP-55. IT SHALL ALSO BE SUITABLE TO WITHSTAND THE FAULT LEVEL OF 50 KA FOR 0.25 SECONDS. TO BE PROVIDED AS PER DESIGN</p> <p>M4.10 SPACE HEATERS : 240 VOLTS A.C.</p> <p>M4.11 VOLTAGE</p>	पृष्ठ 14 का 9 Page 9 of 14			
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सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO. सामग्री सूची संख्या को अधिकांशित करती।	<p>M5.0 SPECIAL REQUIREMENTS:</p> <p>M5.1 SEPARATE TERMINAL BOX FOR WINDING (ARMATURE AND FIELD) AND SPACE HEATERS SHALL BE PROVIDED. THE MOTOR WOULD OPERATE IN AN ENVIRONMENT OF OIL FUMES.</p> <p>M5.2 THE MOTOR SHALL BE RE-WOUNDABLE.</p> <p>M5.3 THE MOTOR SHALL HAVE ON LINE GREASING FACILITY.</p> <p>M5.4 THE MOTOR CONSTRUCTION SHALL BE SUITABLE FOR EASY DISASSEMBLY AND REASSEMBLY.</p> <p>M5.5 MOTOR SHALL BE PAINTED WITH PAINT SUITABLE FOR WORKING CONDITION AND ITS COLOUR SHALL BE INTIMATED LATER ON.</p> <p>M5.6 THE MOTOR SHALL BE THOROUGHLY DEGREASED AND SHARP EDGES AND SCALES REMOVED AND TREATED WITH ONE COAT OF PRIMER AND TWO COATS OF ENAMEL PAINT. FAN SHALL ALSO BE PAINTED TO WITHSTAND CORROSION.</p> <p>M5.7 MOTOR BEARINGS (DE & NDE) SHALL BE SEALED TYPE TO AVOID FREQUENT RE-GREASING.</p> <p>M5.8 LIMITS OF MECHANICAL VIBRATIONS SEVERITY SHALL BE LIMITED TO VIBRATION GRADE "R" (REDUCED) AS PER IS: 12075.</p> <p>M6.0 TESTS AT MANUFACTURER'S WORKS:-</p> <p>(i) MOTOR AFTER COMPLETE ASSEMBLY SHALL BE SUBJECTED TO BOTH TYPE AND ROUTINE TESTS AS PER IS: 4722. TYPE TEST SHOULD NOT BE MORE THAN 5 YEARS OLD w.r.t. DATE OF ORDERING.</p> <p>(ii) IN ADDITION THE FOLLOWING TESTS SHALL ALSO BE CARRIED OUT.</p> <p>(a) DEGREE OF PROTECTION TEST TO CONFORM TO THE SPECIFIED DEGREE OF PROTECTION (TYPE TEST).</p> <p>(b) 20% OVERSPEED TEST FOR 2 MINUTES (ROUTINE TEST).</p> <p>(c) MEASUREMENT OF VIBRATION (ROUTINE TEST) AS PER IS: 12075.</p> <p>(d) MEASUREMENT OF NOISE AS PER IS: 12065. MOTOR NOISE LEVEL SHALL BE LIMITED SO AS TO ACHIEVE PUMP-MOTOR SET NOISE LEVEL AS GIVEN IN CLAUSE 7.4 ON PAGE-3.</p> <p>M7.0 DATASHEET WITH FOLLOWING POINTS TO BE FURNISHED BY BIDDER ALONG WITH OFFER:-</p> <p>THESE SHALL BE SUPPLIED IN TWO COPIES EACH.</p> <p>M7.1 TYPE AND FRAME SIZE.</p> <p>M7.2 STARTING TIME IN SECONDS:</p> <p>M7.2.1 WITH 100% VOLTAGE AT TERMINALS.</p> <p>M7.2.2 WITH 85% VOLTAGE AT TERMINALS.</p> <p>M7.2.3 WITH 80% VOLTAGE AT TERMINALS.</p> <p>M7.3 SAFE STALL TIME AT 100% RATED VOLTAGE UNDER HOT CONDITION.</p> <p>M7.4 MOTOR GD VALUE.</p> <p>M7.5 WEIGHT OF MOTOR / ROTOR</p> <p>M7.6 EXPECTED LIFE OF BEARING.</p> <p>M7.7 TYPE AND SIZE OF CABLE FOR WHICH GLAND IS PROVIDED IN THE TERMINAL BOX.</p> <p>M7.8 MOTOR KW RATING CALCULATION, W.R.T PUMP REQUIREMENT.</p> <p>M7.9 VALUE OF STARTING RESISTANCE / RESISTANCES.</p> <p>M7.10 DATA IN RESPECT OF ALL ITEMS MENTIONED AT PARA M1.0 TO M5.0 OF ANNEXURE-I.</p> <p>M8.0 DOCUMENTS TO BE FURNISHED WITHIN FOUR WEEKS OF PLACEMENT OF ORDER.</p> <p>M8.1 SIX HARD COPIES AND ONE SOFT COPY (IN PDF FORMAT) OF MOTOR DATA SHEET AND G.A. DRAWING.</p>			
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सामग्री सूची संख्या INVENTORY NO. P-5474	REV. NO. 12		निर्माणकर्ता WORKED BY H.GUPTA	 8/2/14	8/2/14
			जांचकर्ता CHECKED BY ANUJ JAIN	 8/2/14	8/2/14

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सामग्री सूची संख्या को अधिकारित करना	SUPERSEDES INVENTORY	<p>M8.2 DRAWING SHOWING TERMINAL DETAIL OF ALL TERMINALS AND LOCATION AND DIMENSION OF TERMINAL BOXES.</p> <p>M8.3 ROTOR WEIGHT AND TOTAL MOTOR WEIGHT.</p> <p>M8.4 CHARACTERISTIC CURVES OF THE MOTOR.</p> <p>M9.0 SIX COPIES OF TESTS CARRIED OUT AS PER CLAUSE NO. 6.0 ON EACH MOTOR SHALL BE FURNISHED TO BHEL FOR SCRUTINY AND APPROVAL. ONLY ON ACCEPTANCE FROM BHEL SIDE, MOTOR CAN BE CONSIDERED SUITABLE FOR DISPATCH.</p>																																															
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.	<u>ANNEXURE-II</u> <u>DATA TO BE FURNISHED BY BIDDER ALONG WITH OFFER FOR JACKING OIL PUMP</u>																																																
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सामग्री सूची संख्या को अधिकृत करता	SUPERSEDES INVENTORY	<p>A3.5 TYPE OF BEARINGS USED A3.6 TYPE OF COUPLING A3.7 PACKING</p> <p>A4.0 CONNECTIONS A4.1 SUCTION SIZE A4.2 DISCHARGE SIZE</p> <p>A5.0 DRAWINGS A5.1 GENERAL ARRANGEMENT AND SECTIONAL DRAWING ENCLOSED WITH OFFER. YES/NO</p> <p>A6.0 WEIGHT SCHEDULE A6.1 WEIGHT OF PUMP A6.2 WEIGHT OF MOTOR</p> <p>A7.0 CHARACTERISTIC CURVES A7.1 POWER CONSUMPTION / DISCHARGE PRESSURE A7.2 DISCHARGE QUANTITY / DISCHARGE PRESSURE A7.3 DISCHARGE QUANTITY / EFFICIENCY A8.0 ANY DEVIATION TAKEN AGAINST SPECIFICATION. YES/NO A9.0 DEVIATIONS TAKEN AS MENTIONED HERE A10.0 HYDRAULIC TEST PRESSURE</p>				
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INVENTORY

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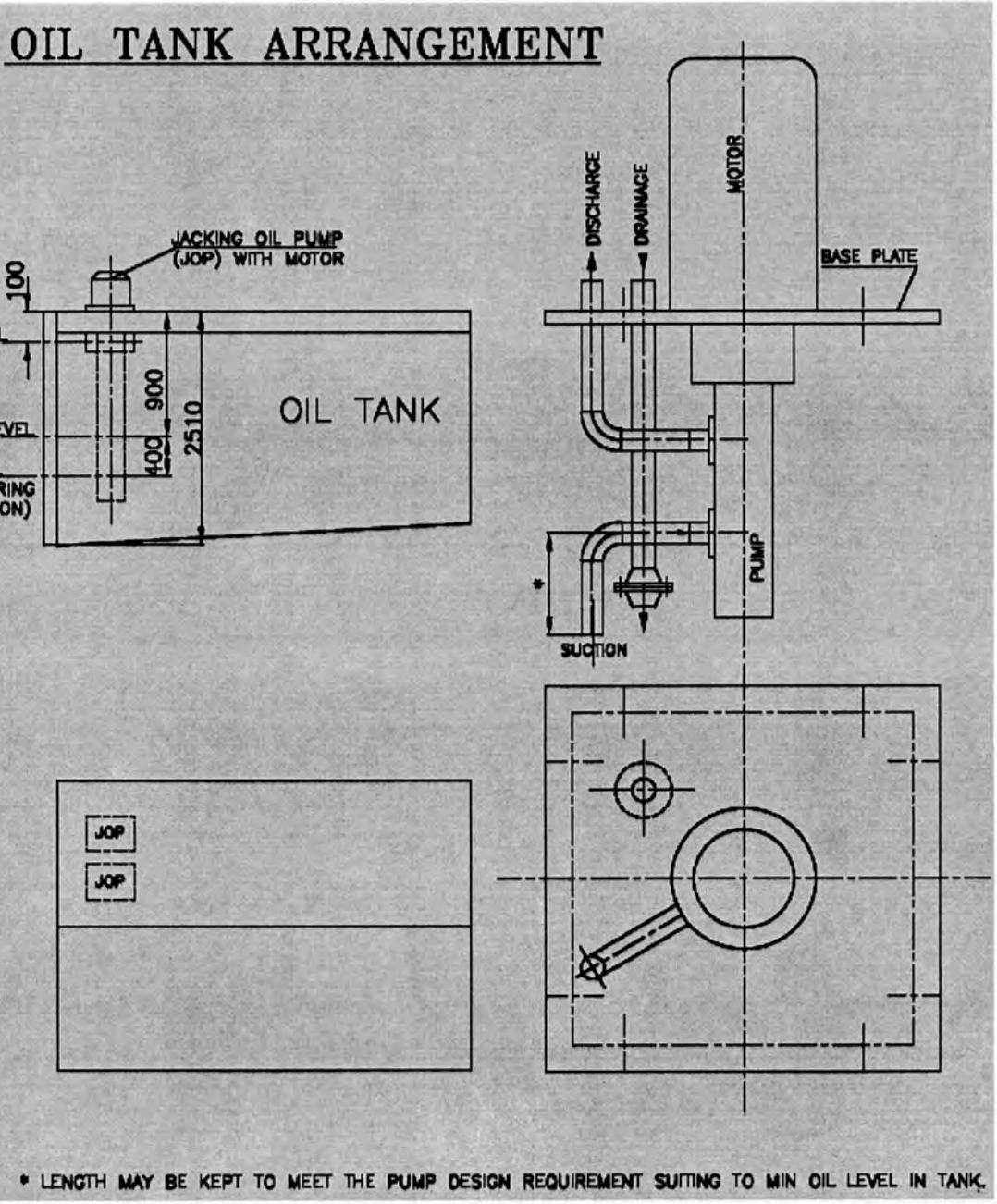
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निर्माणकर्ता

WORKED BY

H.GUPTA

H. Gupta

8/2/14

जांचकर्ता

CHECKED BY

ANUJ JAIN

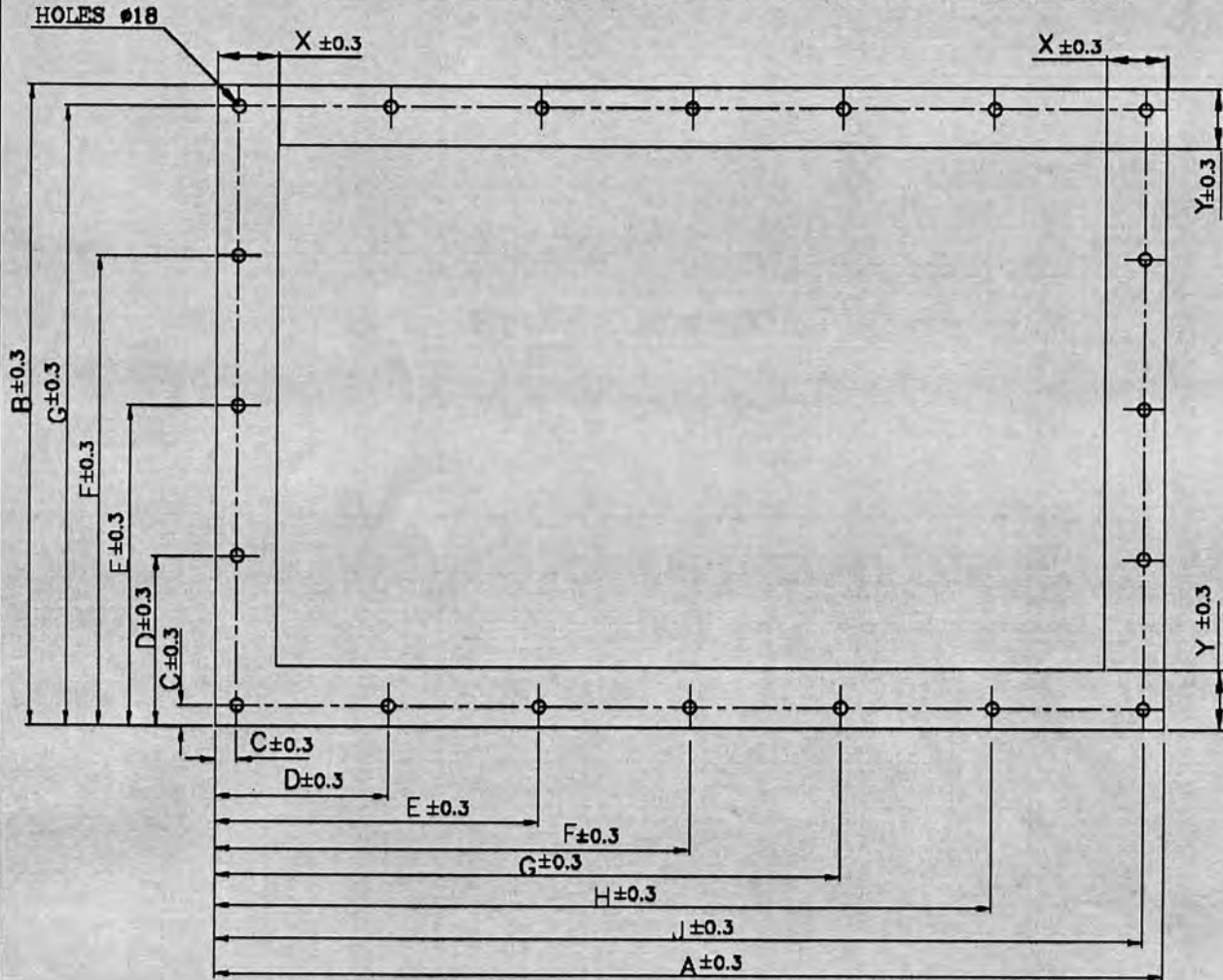
Anuj Jain

8/2/14

उत्पाद मानक

PRODUCT STANDARD
(STEAM TURBINE ENGINEERING)

BED PLATE EXISTING ON OIL TANK



BED PLATE TYPE	A ± 0.3	B ± 0.3	C ± 0.3	D ± 0.3	E ± 0.3	F ± 0.3	G ± 0.3	H ± 0.3	J ± 0.3	X ± 0.3	Y ± 0.3	NO. OFF HOLES
AA	700	700	50	250	450	650	-	-	-	80	80	12
BB	700	700	35	245	455	665	-	-	-	60	60	12
CC	1320	900	30	240	450	660	870	1080	1290	85	85	20

Note:- Bed Plate type "AA" to be supplied unless otherwise specified in tender.

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REV. NO. 12

निर्माणकर्ता

WORKED BY

H.GUPTA

जांचकर्ता

CHECKED BY

ANUJ JAIN

02/14

02/14

20

SIGN & DATE		<h2 style="margin:0;">PRODUCT STANDARD</h2> <p style="margin:0;">(PROJECT ENGINEERING DEPARTMENT)</p>	<h1 style="margin:0;">ST46003</h1>
			Page 1 of 5

PURCHASE SPECIFICATION FOR DIRT CATCHER.

1. **SCOPE:** The specification covers the Y-type dirt catcher employed to protect the spray nozzle at downstream.


2. **TECHNICAL DATA:**

	VAR. I	VAR. II	VAR. III	VAR. IV	VAR. V	VAR. VI
SIZE	NB 25	NB 40	NB 40	NB 65	NB 40	NB 40
PRESSURE RATING	40 ata	64 ata	40 ata	40 ata	64 ata	64 ata
Medium FLOW RATE	Condensate 0.88 kg/sec.	Condensate 2.08 kg/sec.	Condensate 2.08 kg/sec.	Condensate 3.1 kg/sec.	Condensate 2.8 kg/sec.	Condensate 3.33 kg/sec.
END CONN. FLANGE ALONG WITH COUNTER FLANGE	DIN 2635	DIN 2636	DIN 2635	DIN 2635	DIN 2636	DIN 2636
APERTURE SIZE	Ø 0.6 mm	Ø 0.6 mm	Ø 0.6 mm	Ø 1.2 mm	Ø 0.6 mm	Ø 0.6 mm
WIRE DIA	Ø 0.4 mm	Ø 0.4 mm	Ø 0.4 mm	Ø 0.6 mm	Ø 0.4 mm	Ø 0.4 mm

3. **MATERIAL:**
- 3.1 Body with integrally cast flanges along with counter flange -Carbon steel ASTM A216 Gr.WCB
 - 3.2 Wire mesh - Stainless steel , AISI 321
 - 3.3 Bolts and nuts – Bolts- 8.8, IS 1367 & Nuts- 8, IS 1367 as per IS 1364
 - 3.4 Washer - IS:3063, Mat:- SPR ST , IS 4072
 - 3.5 Gasket – Grafoil Sheet /Grafoil filled spiral wound as per DIN2690 , thickness 3mm

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INVENTORY NO.	SIGN & DATE						
P-5390	16/11/13						
TSX	B. CHAUDHARY	16.11.13	WORKED BY	SUDHIR K. GAUTAM			
QAX	VIBHUTI SHAH	14/01/13	CHECKED BY	UTKARSH GOGIA			
AGREED DEPTT.	NAME	DATE & SIGNATURE	SUPERVISED BY	ANUJ JAIN			
			APPROVED :	(A.B.GUPTA) AGM, PED			Gp.No
			PREPARED :	PED			8.20
REV.NO. 10			ISSUED :		TSX	DATE : 18.12.81	
Dt. 08/01/13							

SIGN & DATE		<h2 style="margin: 0;">PRODUCT STANDARD</h2> <p style="margin: 0;">(PROJECT ENGINEERING DEPARTMENT)</p>	<h1 style="margin: 0;">ST46003</h1> <p style="margin: 0;">Page 2 of 5</p>
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SUPERSEDES INVENTOR

4. END CONNECTIONS:

Dirt Catcher end connections shall be provided by Vendor which includes Flanges, counter flanges, Gaskets, bolt, nuts and washer, all shall be as per Technical Data table given above.

5. DOCUMENTS:

A. Documents required along with the tender:

The tenderer shall submit the following documents/along with the offer. If any information/documents listed below are missing/ incomplete; the offer shall not be considered by BHEL.

1. Cross sectional drg. of the dirt catcher giving part nos. , description, part material overall dimensions, space required and direction for removal of element & direction of flow.
2. End connection details.
3. Filled in data sheet-1
4. Quality check programme.
5. List of commissioning spares / spare for operation of 3 years and 5 years.
6. Any special requirement.

The document submitted along with tender and approved by BHEL shall be the basis of the order and no changes shall be made without approval from BHEL.

Examination and approval of documents submitted along with the tender by BHEL shall not release the manufacturer and his sub-contractors of their responsibility under the contract.

B. Documents after placement of the order:


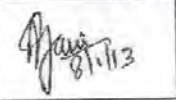
Supplier shall submit the documents (as given in Clause 5, A.) with Project name & P.O. number in the title block.

1. 10 copies of finalized contract drawing incorporating BHEL comments if any for each station – 8 weeks.
2. 10 copies of Operation / Maintenance / erection Instructions for each station – 12 weeks.
3. 2 copies of Operation / Maintenance / erection Instructions along with dispatch box & soft copies shall be made available to BHEL.
4. Instruction on conservation and deconservation – 12 weeks.

6. INSPECTION & TESTS:

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SIGN & DATE
16/11/13

Inventory No. D-5390	REV. NO. 10				WORKED BY UTKARSH GOUDA	 8/11/13
					CHECKED BY ANU J JAIN	 8/11/13



PRODUCT STANDARD

(PROJECT ENGINEERING DEPARTMENT)

ST46003

Page 3 of 5

SUPERSEDES INVENTORY NO.

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SIGN & DATE

6.1 Hydraulic Test:

Hydraulic test shall be carried out on each body using water containing a suitable inhibitor to prevent rusting of the body & internals after test. No leakage shall occur during the test. After the hydraulic test the internals shall be wiped clean & dry. With reference from ANSI/API6D test pressure will be 1.5 times the nominal pressure for duration of 2 minutes. BHEL or BHEL's customer shall have the right to witness the test. However the test certificate shall be furnished to BHEL. The test certificate should specifically mentioned the test pressure & duration of test along with following information:

1. Tag No.
2. Size
3. Name of manufacturer
4. Plant order No.
5. Date of testing.

6.2 Test Certificate of mesh size from recognized test house.

7. IDENTIFICATION:

Following information should be engraved on a metal sheet properly fixed at a convenient location of the body or body cover. All inscriptions shall be in two languages i.e. Hindi & English, with Hindi on top.

Direction of flow should be engraved on the body.

- | | | |
|-------------|---------------------|--------------------------|
| (1) Tag No. | (3) Pressure rating | (5) Year of manufacturer |
| (2) Size | (4) Manufacturer | (6) P.O. No. |

8. PROTECTION FOR DESPATCH:

- 8.1 Ends shall be protected from external damage and sealed against the ingress of dirt.
- 8.2 A wooden blank should be bolted to the flanges using a minimum of four bolts.
- 8.3 To prevent any effect of salt laden atmosphere high humidity & moisture during shipment & storage. The dirt catcher and other accessories shall be properly conserved suitable to last for 2 years & covered by polythene sheet before packing in the wooden box.

9. GUARANTEE:

The supplier shall guarantee trouble free and satisfactory operation of the equipment for a period of 2 years after installation and commissioning or a period of 36 months from the day the equipment leaves the supplier's works whichever is earlier.

If during commissioning / erection at site any deficiency in a part 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 charge.

The supplier if he so desires may depute his representative to site at his own cost otherwise the findings of BHEL representative shall be final and binding on the supplier of the Dirt catcher.

INVENTORY NO. P-5398	REV. NO. 10			WORKED BY UTKARSH GOGIJA	<i>[Signature]</i> 8/11/13
				CHECKED BY ANUS JAIN	<i>[Signature]</i> 8/11/13



PRODUCT STANDARD
(PROJECT ENGINEERING DEPARTMENT)

ST46003

Page 4 of 5

SIGN & DATE

SUPERSEDES INVENTORY

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10. SPARES:

The supplier shall quote item wise price of recommended spares for 3 years & 5 years operation respectively. Vendor to supply 2 sets of extra gaskets in spare as per clause no. 3.5.

11. QUALITY CHECK PLAN:

The supplier shall indicate his production plan & BHEL shall indicate the check hold points for stage checking. BHEL / BHEL's customer shall have right to witness the checking.

12. STANDARDS:

Wherever standards have been quoted the latest issue and amendments shall apply.

13. GENERAL:

The tenderer can make suitable offers even if there are minor deviations which do not affect the efficient functioning of the equipment. However the deviation must be clearly spelt out. Suppliers shall also fill the Data sheet-1 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 specification are not submitted along with the offer.

NOTE: - All dimension are given in mm except otherwise specified.

SIGN & DATE

[Signature]
16/1/13

INVENTORY NO.

P-5598

REV. NO.

10

WORKED BY

UTKASH GOGIA

[Signature]


8/1/13

CHECKED BY

ANUJ JAIN

[Signature]

8/1/13

SIGN & DATE		PRODUCT STANDARD (PROJECT ENGINEERING DEPARTMENT)		ST46003		
				Page 5 of 5		
SUPERSIDES INVENTORY	<u>DATA SHEET--1</u>					
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	1.	Nominal pressure rating				
	2.	End connection to DIN 2635 / DIN 2636				
	3.	Nominal size				
	4.	Pressure drop. A) Normal Operation B) 50% choke condition				
	5.	Hole dia.				
	6.	Wire dia.				
	7.	Gross filtering area				
	8.	Net filtering area				
	9.	Documents as envisaged in clause No. 5			Yes / No	
	10.	Test Certificates				
	10.1	Hydraulic Testing of body			Yes / No	
	11.2	Material composition & Mech. Properties of following parts			Yes / No	
	11.2.1	Body				
11.2.2	Cover / Bonnet					
11.2.3	Mesh					
11.2.4	Seat					
11.2.5	Seat ring					
12.	Mesh size from recognized test house.			Yes/No		
13.	Dirt holding capacity					
SIGN & DATE	16/1/13	REV. NO.	10	WORKED BY	UTKARSH GOUDA	8/1/13
INVENTORY NO.	P-5398			CHECKED BY	ANUS JAIN	8/1/13

For DP switch cum indicator (MAV30CP011) following instructions needs to be followed by vendor. Changes with respect to specification no.ST46056(C&I) to read as below:

- 1) for sensing element – diaphragm or bellow
- 2) material of sensing element.....:
316 SS pressure element nylon movement
- 3) Differential pressure range:
to suit the process please furnish the withstanding differential pressure of the strainer for selection of gauge cum switch and selection of set value of switch.
- 4) Switching repeatability –. Repeatability shall be $\pm 0.5\%$ FSR.
- 5) Accuracy : an accuracy of $\pm 1\%$ of span with adjustable contact
- 6) Contact type : Auto reset micro switch with tamper proof external adjustable set values

Contact rating: 0.2 A at 220 V DC
No. of contacts: 2 SPDT contacts
- 7) Additional requirement: accessories like snubbers for pump discharge applications, chemical diaphragm with 15 m capillary for each limb for all corrosive and oil services and 5 way manifold, name plate & mounting brackets, etc. should be provided and Material of accessories will be SS.

Other clauses in the specification are unchanged.



उत्पाद मानक

STEAM TURBINE ENGINEERING
PRODUCT STANDARD

ST47025
HW0690097

पृष्ठ 4 का 1

Page 1 of 4

सुपरसेडिङ इन्वेंटरी नम्बर
SUPERSEDES INVENTORY NO

कॉपीराइट और कॉन्फिडेंशियल
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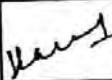
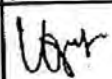
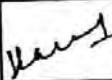
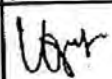
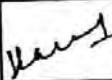
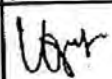
स्वाभाविकर एवं गोपनीय
स्वतन्त्रता के अधिकारों का सम्मान करना और गोपनीयता को सुरक्षित रखना
स्वाभाविक एवं गोपनीय
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हस्ताक्षर एवं तिथि
SIGN & DATE
26.7.04
INVENTORY NO.
P-5522

GENERAL PURCHASE SPECIFICATION OF VALVES

- 1.0 SCOPE :-** This specification covers the general technical requirements for all valves to be used in turbine integral system handling hot condensate, superheated steam, air steam mixture, steam water mixture, oil & oil vapours, fire resistant fluid & its vapours. Separate specifications to indicate specific requirements e.g. design parameters, nominal size etc. have been prepared for each valve which shall be enclosed with this specification whenever any requirement arises.
- 2.0 RATING :-** Rating of the valves shall be selected by valve supplier for the working conditions as specified in separate specification / documents / drawings / enquiry of desired valve to which specification is enclosed. The rating shall be as per ANSI B16.34 or approved equivalent.
- 3.0 END CONNECTION**
- 3.1** Butt weld end connections of valves shall be suiting to pipe size as mentioned in enclosed specification of valve.
- 3.2** In case of flanged end valves, the supplier shall separately quote for the counter flanges, gaskets, O-ring & fastners of required pressure-temperature rating.
- 4.0 MATERIAL :-** All materials used in the construction of the valve body and other component shall be selected from the best available material for the purpose. The purchaser / owner reserves the right to review the material specification of valve components and to ask changes in selection of material. Any specific material for particular valve has been mentioned in the valve specification.
- 5.0 DRAINAGE OF VALVE BODY :-** Depending on the construction and placement of the valve in piping system, a drain tapping in the body may be required for valves used in oil, steam and water lines. This shall be checked and intimated by purchaser / owner after the receipt of offer or at the time of placement of order. The tapping shall be at the lowest point and on the center line, which shall be suitably plugged with a threaded plug & washer. The drain size for various valve sizes shall be as follows:-
- NB50 to 100 - 15 mm
NB125 to 300 - 20 mm
NB350 & above - 25 mm
- 6.0**
- Each valve shall be marked with an arrow on body showing direction of flow of medium, not applicable for gate valve which can be mounted with either of the sides.
 - Handwheel shall have the indication for opening & closing direction.

हस्ताक्षर एवं तिथि SIGN & DATE		नाम NAME		दिनांक एवं हस्ताक्षर SIGNATURE & DATE	
TSX	D.L. OBEROI	अनुवादक TRANSLATED BY			
QAX	S.S. CHAUHAN	निरीक्षणकर्ता WORKED BY	S.K. GUPTA		26.7.04
सहमत विभाग AGREED DEPTT.	नाम NAME	जांचकर्ता CHECKED BY	V.K. GUPTA		26.7.04
	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	V.K. GUPTA		26.7.04
		स्वीकृति APPROVED :	<i>S.K. Shukla</i>		
REV.NO. 02		तैयार PREPARED :	जारी ISSUED :	दिनांक DATE :	
Dr. 09/07/04		STE	STE (TL) HARDWAR	26.3.84	

निर्देशक के हस्ताक्षर SIGN & DATE		उत्पाद मानक STEAM TURBINE ENGINEERING PRODUCT STANDARD	ST47025 HW0690097 पृष्ठ 4 का 2 Page 2 of 4								
SUPERSEDES INVENTORY NO. निर्देशक द्वारा प्रमाणित अधिकृत हस्ताक्षर	<p>3. GLAND SEALING :- Valves working under vacuum are to be provided with gland sealing arrangement.</p> <p>7.0 HYDRAULIC TEST :- Hydraulic test shall be carried out on each valve. After the hydraulic test the internals shall be wiped, cleaned and dried. The body & seat shall be tested hydraulically in accordance with ANSI B16.34. For steam & air service valves, seat leakage shall additionally be tested by air as per ANSI B16.34. Purchaser/owner shall have the right to witness the test. However the test certificates mentioning about test pressure & duration of test along with following informations shall be furnished to purchaser.</p> <ol style="list-style-type: none"> 1. Valve identification No. 2. Type of valve & description 3. Valve size 4. Name of manufacturer 5. Project name 6. Date of testing <p>8.0 CLEANING & SURFACE PROTECTION :- The surfaces shall be rubbed with a solvent (e.g white spirit) to clean & prepare them for the application of the paints. Unmachined surface shall be blast cleaned to remove any rust. Stainless steel portion shall not be painted.</p> <ol style="list-style-type: none"> 1. Outer surface to be protected by painting with two coats of Red oxide Zinc chromate primer. 2. Inside surface to be protected against rusting and corrosion. <p>9.0 IDENTIFICATION PLATE :- Following information in English shall be engraved on a metal sheet properly fixed at a convenient location on the body or body cover.</p> <ol style="list-style-type: none"> 1. Identification No. as specified in enclosed valve specification. 2. Valve type & Description 3. Valve size 4. Pressure rating 5. Manufacturer 6. Year of manufacturing 7. Project name 										
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स्वतंत्रधिकार एवं गोपनीय इस दस्तावेज़ में दी गई सूचना भारत भारी बिजलीकरण लि. की संपत्ति है। इसका प्रयोग बिना अनुमति के न किया जाए।											
निर्देशक के हस्ताक्षर SIGN & DATE 26.7.04											
INVENTORY NO. P-55222	REV. NO. 02		<table border="1"> <tr> <td>निर्माणकर्ता WORKED BY</td> <td>S.K.GUPTA</td> <td></td> <td>9/7/04</td> </tr> <tr> <td>जांचकर्ता CHECKED BY</td> <td>V.K.GUPTA</td> <td></td> <td>9/7/04</td> </tr> </table>	निर्माणकर्ता WORKED BY	S.K.GUPTA		9/7/04	जांचकर्ता CHECKED BY	V.K.GUPTA		9/7/04
निर्माणकर्ता WORKED BY	S.K.GUPTA		9/7/04								
जांचकर्ता CHECKED BY	V.K.GUPTA		9/7/04								

SUPERSEDES INVENTORY NO.
 अगली सूची नमून
 अगले संशोधन संख्या

16.0 ACTUATORS :- As mentioned in valve specification, separately enclosed with this specification, the actuators shall be supplied along with handwheel to facilitate manual operation of valve. Direction of rotation of handwheel for opening and closing of valve shall be indicated on handwheel.

17.0 DOCUMENTS

17.1 Documents required along with the offer / at the time of registration :- The supplier shall submit 6 copies of following documents in English language along with the offer to enable purchaser for complete technical scrutiny of the offer.

1. Cross sectional & dimensional drawing of valve along with actuator (if required) in assembled condition giving items nos. description, material specification of all components, details of bypass valve (if envisaged), gland sealing arrangement, end connection details, clear space required for operation & dismantling of valve & actuator for maintenance for approval by the purchaser.
2. Quality plan for approval by purchaser.
3. List of commissioning spares, maintenance spares for 3 to 5 years of operation for reference.
4. Any special requirements of lubricant for reference.

The document submitted along with the offer at the time of registration and approved by purchaser / owner shall be the basis of the order and no changes shall be made with out permission of purchaser / owner.

Scrutiny and approval of documents, submitted along with the offer, by purchaser / owner shall not release the supplier and his sub-vendors of their responsibility under the contract .

17.2 Documents to be submitted after placement of the order :-

1. 10 copies of finalised contract drawing within 8 weeks.
2. 10 copies operation/ maintenance/ erection instructions for each station within 12 weeks.
3. Instruction of conservation and deconservation within 12 weeks.

18.0 Six copies of all actual test certificates and quality documents shall be furnished to purchaser/owner.

19.0 If there are any deviation from this specification in offer, the same shall be clearly spelled out clausewise by supplier.

20.0 Cross referred standards :- ANSI B16.34

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स्वत्वाधिकार एवं गोपनीय
 इस दस्तावेज में दी गई सूचना भारत भारी इलेक्ट्रिकल्स लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण बिना भारत भारी इलेक्ट्रिकल्स लिमिटेड की लिखित अनुमति के बिना नहीं किया जाना चाहिए।

SIGN & DATE
 26.7.04

INVENTORY NO.
 P-5522

REV. NO. 02

निर्माणकर्ता
WORKED BY

जांचकर्ता
CHECKED BY

S.K.GUPTA

V.K.GUPTA

9/7/04

9/7/04



PRODUCT STANDARD
STEAM TURBINE ENGINEERING

ST 47027

PAGE 1 OF 2

Own Experience

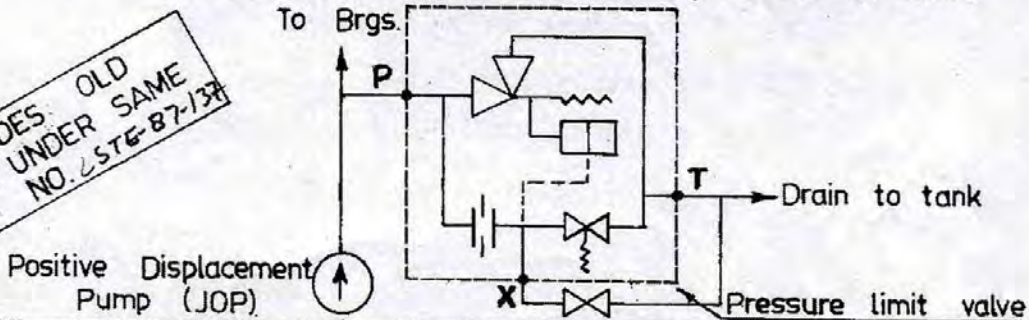
TECHNICAL SPECIFICATION OF PRESSURE LIMIT VALVE

1.0 SCOPE: This Specification covers design manufacturing assembly, testing and supply of pressure limit valve alongwith adapting flanges as per details given below:

Var.	Identifi- cation No.	Design Parameter	Medium of flow	Set Pr.	Line flow
01	MAV35AA001	225 bar	Servoprime 46 of IOC KIM Viscosity 25 cs at 50°C and density 860 Kg/m ³ . or equivalent.	120 bar	1.26 Lit/sec
02	"	"		130 bar	1.90 Lit/sec.
03	"	"		189 bar	1.68 Lit/sec
04	"	"		175 bar	0.91 Lit/sec
05	"	"		182 bar	2.25 Lit/sec.
06	"	"		180 bar	1.30 Lit/sec

2.0 FUNCTION : The valve is employed to maintain a constant pressure in Jacking oil line to bearings. The valve should be a pilot operated relief valve. The function is explained hereunder with the help of a diagram.

The valve shall have three connection one for pressure oil inlet (P), one for draining excess oil to main oil tank and one for quick pressure dropping (X). It should be possible to set the pressure at site.



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SUPERSEDES OLD SHEET UNDER SAME PAGE NO. 257E-87-137

SIGN & DATE	AGREED:	NAME	SIGN. & DATE
		DRAWN	M. SINGH
	TSX	WORKED	R. PANJA
	QAX	CHECKED	A. B. GUPTA
	DEPT	SUPERVISED	R. C. SACHAN

INVENTORY NO. P-5520	Revision : 03	Distribution	Qty.	Approved :	ST
	Name	Sign	Date	ENG. DEV. MANAGER	26.3.84
	S.R. Gupta	[Signature]	12.2.08		
Reaffirmed Feb., 2008	Prepared STE	Issued STE (TL) HARDWAR	Date		



PRODUCT STANDARD

ST 47027

STEAM TURBINE ENGINEERING

PAGE 2 OF 2

SIGN & DATE
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 SIGN & DATE
 INVENTORY No.

3.0 RATING :- Rating of the valve to be decided by supplier as per working parameters, mentioned in clause 1.0 + clause 2.0 of Specification ST 47025.

4.0 MATERIAL :- Material to be selected by supplier and to be informed to purchaser for their comments, if any. also refer clause 4.0 of ST 47025.

5.0 EVD CONNECTION: P & T ^{shall be of} Weld neck type suitable to weld with pipe ϕ 33.7 x 4.0. and Connection x $R\frac{1}{4}$ ".

6.0 For completion of this specification, read this specification alongwith general purchase specification of valves ST 47025.

7.0 In continuation to clause 15.0 of Spencification 47025, the minimum test requirements envisaged by follows:-

7.1 ~~Test~~
The material of components of valve such as body bonnet stem and fastners shall be tested as per relevant specification for the chemical composition and mechanical properties. For remaining components compliance certificates shall be furnished.

7.2 RT/UT on all pressure retaining parts. DPT on Steam, seat and weld ends.

7.3 Colour matching of valve seat and plug in case of metal to metal contact.

7.4 Functional test including 3 poppings at set pressure.

Revision: 03

WORKED BY	A K. JAIN	<i>A.K. Jain</i>	24.3.84
CHECKED BY	K.C. SACHAN	<i>K.C. Sachan</i>	24.3.84

INVENTORY No. P-5520
SIGN & DATE 15/5/84