

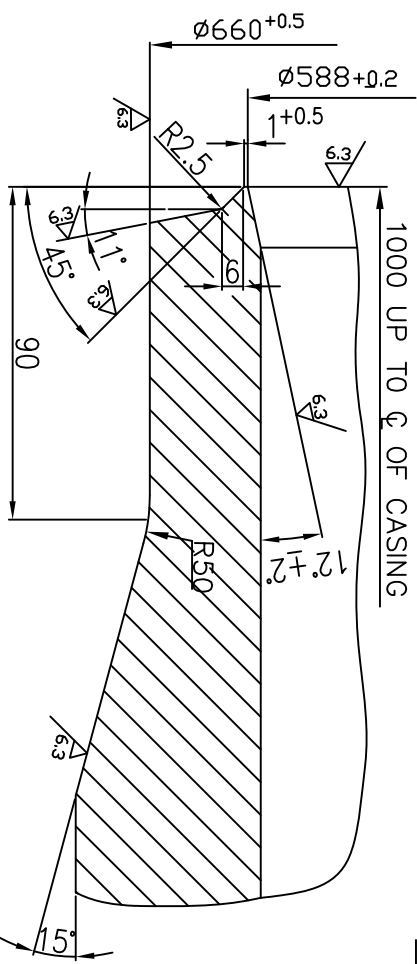
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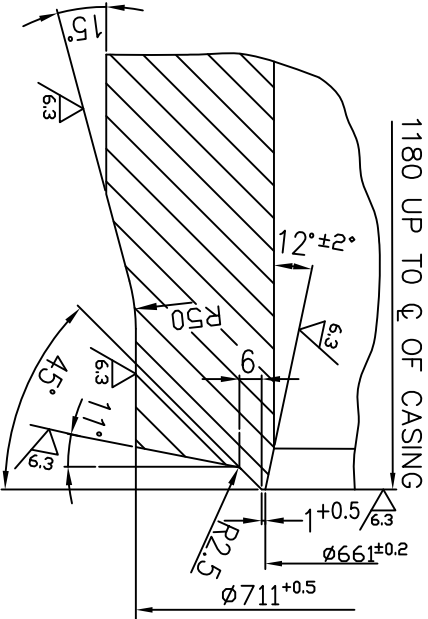
LP BYPASS SV ACTUATOR

TECHNICAL REQUIREMENTS :-

1. THE VENDOR TO TAKE CARE OF FOLLOWING POINTS IN THEIR OFFER W.R.T. LP BYPASS VALVE :
 - 1.1. MULTI-HOLE PLUGS SHALL NOT BE USED DUE TO POTENTIAL FOR CONTAMINATION STICKING BETWEEN PLUG AND SEAT.
 - 1.2. A COMBINATION OF CAGE GUIDING AND TOP GUIDING FOR PLUGS SHALL BE PROVIDED TO ELIMINATE POSSIBILITY OF VIBRATION.
 - 1.3. CONICAL DIFFUSERS AS REQUIRED SHALL BE OF WROUGHT CONSTRUCTION PROVIDED WITH HIGHER MECHANICAL STRENGTH AND TO ALLOW FOR OPTIMUM VELOCITY DISTRIBUTION DOWNSTREAM OF THE DIFFUSERS.
 - 1.4. THE DIFFUSERS SHALL BE REMOVABLE THROUGH BONNET TO ALLOW FOR INSPECTION AND MAINTENANCE.
 - 1.5. PACKING SHALL BE COMPRESSED BY MEANS OF A BOLTED FLANGE DESIGN.
 - 1.6. SCREWED GLAND TYPE PACKING RETAINERS SHALL NOT BE PROVIDED.
 - 1.7. VALVE PACKING SHALL BE PURE GRAPHITE.

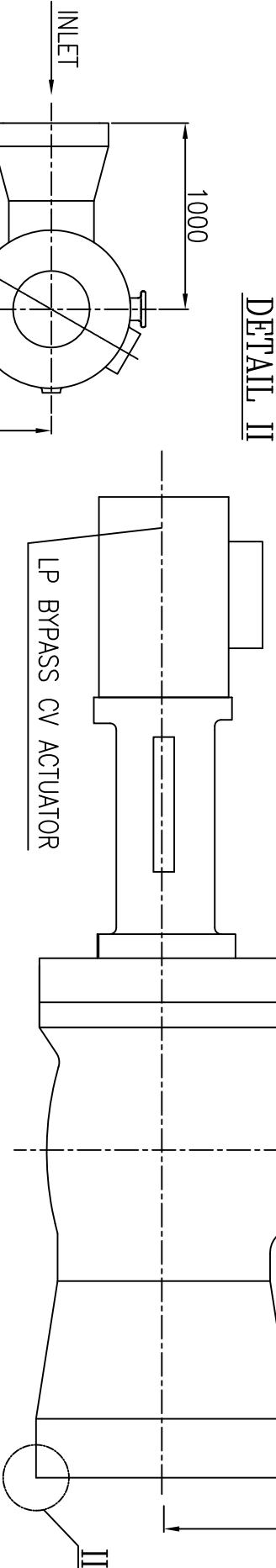


EDGE PREPARATION DETAIL AFTER HYDRAULIC TESTING (STEAM INLET SIDE)



DETAIL I

EDGE PREPARATION DETAIL AFTER HYDRAULIC TESTING (STEAM OUTLET SIDE)



- NOTE :-**
1. PROVISION OF VALVE SUSPENSION SHALL BE KEPT BY THE VENDOR IN LINE WITH BHEL DRG. NO. 0-12303-25000 (REFER SECTION D-D AND VIEW-Z) IN ORDER TO HAVE VALVE SUSPENSION ARRANGEMENT IN LINE WITH BHEL DRG. NO. 0-12321-16000
 2. SUSPENSION OF VALVE AS PER DRG. NO. 0-12321-16000 SHALL BE IN BHEL SCOPE.

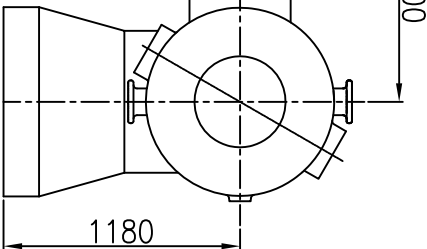
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Inventory No.	Sign & Date	3-12300-28000	Ref.Drawing No>
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VIEW-Z
(WITHOUT ACTUATOR)

OUTLET



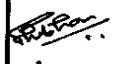
SCHEMATIC ARRANGEMENT OF ANGLE TYPE VALVE

MAT.CODE: W90312300484

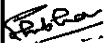
STEAM TURBINE

REV		DATE		ALTERED		CHECKED		REV		DATE		ALTERED		CHECKED		REV		DATE		ALTERED		CHECKED	
GRADE OF UNTOL. DIM																							
M/CG.- AA0230208 m																							
WELDING-CLASS 'B' OF AA0621104																							
GAS CUTTING-TABLE 3 OF AA0621104																							
TITLE :																							
COMBINED LPBP SV & CV																							
WITH ACTUATORS																							
CARD CODE																							
DRAWING NO.																							
3-12300-28100																							
SHEET No. 2 No. OF SHEETS 2																							

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			पृष्ठ 28 का 1 Page 1 of 28																										
समग्री सूची संख्या को अधिकारित करता है	SUPERSEDES INVENTORY NO.	Based on own experience																											
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.		Purchase Specification For <u>Combined LP Bypass Stop & Control Valves</u> <u>With Electro-hydraulic Actuators (EHA)</u> & <u>Hydraulic Power Supply Unit (HPSU)</u> For <u>Steam Turbine</u>																											
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हस्ताक्षर एवं दिनांक SIGN & DATE	<table border="1"> <tr> <td>C.I.E</td> <td>S.K.DAS</td> <td>18/4/11</td> <td>नाम NAME</td> <td>दिनांक एवं हस्ताक्षर SIGNATURE & DATE</td> </tr> <tr> <td>MEMBER-PSC</td> <td>V.K. CHAUHAN</td> <td>18/4/11</td> <td>अनुवादक TRANSLATED BY</td> <td>-</td> </tr> <tr> <td>QAX</td> <td>N.K.MANWANI</td> <td>18/4/11</td> <td>निर्माणकर्ता WORKED BY</td> <td>S.MITTAL 16/4/11</td> </tr> <tr> <td>TSX</td> <td>B. CHOUDHARY</td> <td>16/4/11</td> <td>जांचकर्ता CHECKED BY</td> <td>R.C.AGARWAL 16/4/11</td> </tr> <tr> <td>सहमत विभाग AGREED DEPTT.</td> <td>नाम NAME</td> <td>दिनांक एवं हस्ताक्षर DATE & SIGNATURE</td> <td>पर्यवेक्षणकर्ता SUPERVISED BY</td> <td>R.C.AGARWAL 16/4/11</td> </tr> </table>				C.I.E	S.K.DAS	18/4/11	नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE	MEMBER-PSC	V.K. CHAUHAN	18/4/11	अनुवादक TRANSLATED BY	-	QAX	N.K.MANWANI	18/4/11	निर्माणकर्ता WORKED BY	S.MITTAL 16/4/11	TSX	B. CHOUDHARY	16/4/11	जांचकर्ता CHECKED BY	R.C.AGARWAL 16/4/11	सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	R.C.AGARWAL 16/4/11
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P-6301	REV.NO. 02 (Supersedes) Dt. 16.04.11																												

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सामग्री सूची संख्या को अधिकृत करता है	I TABLE OF CONTENTS 1.0 INTENT OF SPECIFICATION 1.1 Scope Of Contract 1.2 Responsibility of Bidder 1.3 Reliability & Provenness 2.0 FUNCTION 3.0 SCOPE OF SUPPLY 4.0 COMBINED LP BYPASS STOP & CONTROL VALVE: 4.1 Valve Sizing 4.2 Valve Connections (For Piping) 4.3 Valve Seat tightness 4.4 Drain & Warm-up Connections 4.5 Steam Strainer 4.6 Noise Level 4.7 General Valve Mounting Arrangement 4.8 Steam Blowing blanking arrangement 4.9 Other Requirements 5.0 INDIAN BOILER REGULATION 6.0 LP BYPASS STOP & CONTROL VALVE ACTUATORS 6.1 LP Bypass Stop & Control Valve Actuators Schemes (Proposed) 6.1.1 Position Measurement of Valves 6.2 Operating Time 6.3 Mounting Arrangement of Actuators 6.3.1 Mounting Arrangement of Control Block for Actuators 6.3.2 Actuator Control Fluid Connections 6.4 Control Fluid (CF) Specification 6.5 CF Pressure & Temperature 6.6 Control Fluid Tray for LP Bypass Valve Actuator (Vertically mounted) 7.0 HYDRAULIC POWER SUPPLY UNIT (HPSU) 7.1 Electrical Wiring 7.1.1 Instruments in HPSU 7.1.2 Interface with BHEL's system. 7.1.3 Power Supply 7.2 Coating, Cleaning & Preservation				
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सामग्री सूची संख्या INVENTORY NO. P-6301	REV. NO. 02		निर्माणकर्ता WORKED BY SHUBHAM MITTAL		16.4.11
			जांचकर्ता CHECKED BY R.C. AGARWAL		16.4.11

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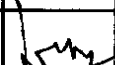
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सामग्री सूची संख्या INVENTORY NO.		SUPERSEDES INVENTORY NO.		II LIST OF APPENDICES TO THIS SPECIFICATION			
सामग्री सूची संख्या को अधिकारित करता है		COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company		- GENERAL ARRANGEMENT OF LP BYPASS VALVES - APPENDIX-1 - HYDRAULIC POWER SUPPLY UNIT FOR LP BYPASS - APPENDIX-2 (TYPICAL) - LP BYPASS STOP VALVE ACTUATOR SCHEME - APPENDIX-3 (TYPICAL) - LP BYPASS CONTROL VALVE ACTUATOR SCHEME - APPENDIX-4 (TYPICAL) - LP BYPASS VALVE (SINGLE STEM) ACTUATOR SCHEME - APPENDIX-5 (TYPICAL) - MANUFACTURING QUALITY PLAN - APPENDIX-6, FORMAT-1			
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P-6301				जांचकर्ता CHECKED BY		R.C. AGARWAL  16.4.11	

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सामग्री सूची संख्या INVENTORY NO.		1.0 INTENT OF SPECIFICATION 1.1 Scope of Contract The Scope of the contract for the system shall be on the basis of the single point responsibility completely covering the following activities and services in respect of all the equipment covered under the specification. i. Detailed functional design, calculation, analysis & engineering of all equipment, systems, all type of spares, special tools for assembly & disassembly of various equipments & steam blowing devices. ii. Material Procurement. iii. Complete manufacturing including functional testing. iv. Providing engineering data, drawings for purchaser/owner's approval. v. Providing instruction manuals, as-built drawings, O & M manuals, safety instructions, waste disposal instructions of hydraulic medium etc. vi. Generation of quality/inspection reports indicating therein the complete test details and their acceptance norms i.e. test certificates indicating therein the chemical, physical & mechanical properties. These test certificates are to be provided as per mutually agreed Quality Plan. vii. Furnishing list of commissioning & recommended spares. viii. Seaworthy packing, preservation and transportation from the manufacturer's works to the nearest port for foreign supply; packing and supply ex-works basis for indigenous supply. ix. Supplier is to make provision that the equipments shall be capable for working continuously at an ambient temperature specified in the input data sheet.				
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हस्ताक्षर एवं दिनांक SIGN & DATE	16/11/11	1.2 Responsibility of bidder: 1.2.1 The bidder shall be responsible for providing all material, equipment and services, specified or otherwise which are required to complete the system and fulfill the intent of ensuring the successful operation, maintainability and the reliability of the complete work covered under this specification. It is not the intent to specify completely here in, all aspects of design and construction of equipment. Nevertheless, the equipment shall conform in all respects to high standards of engineering, design & workmanship & shall be capable of performing in continuous commercial operation, in a manner acceptable to Purchaser/owner.				
सामग्री सूची संख्या INVENTORY	P-6301	REV. NO. 02		निर्माणकर्ता WORKED BY	SHUBHAM MITTAL	16.4.11
				जांचकर्ता CHECKED BY	R.C. AGARWAL	16.4.11

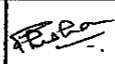
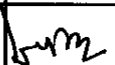
दिनांक एवं हस्ताक्षर SIGN & DATE			उत्पाद मानक PRODUCT STANDARD		ST 47050 पृष्ठ 28 का 6 Page 6 of 28	
सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.	1.2.2 The bidder is requested to carefully examine and understand the specification prior to submitting the technical offer. Any deviation with respect to BHEL specifications shall be clearly identified in the offer & shall be submitted for BHEL review and approval. No deviation will be allowed after placement of order. 1.2.3 The bidder shall furnish the filled up checklist of documents to ensure completeness of their offer. 1.3 Reliability & Provenness: All equipments, components & accessories furnished against this specification shall be from the latest proven product range of the bidder. The satisfactory operation & high reliability of these equipments, components & accessories should have been fully established by a considerable record of successful operation. Purchased items shall be procured only from the proven suppliers & the list of all such items shall be furnished for BHEL review/ approval. The Major casting/ forging shall be procured from experienced vendors only. The vendor to submit list of vendors of major casting/ forgings incorporating their experience in last 5 years for the casting/ forgings of applicable material & weight (equal or higher) for BHEL review/approval. 2.0 FUNCTION: During startup, shutdown due to load shedding or turbine trip out, and also at operations below minimum boiler load, the LP turbine cannot accommodate the entire volume of steam. The LP Bypass control system enables to establish an alternative path for dumping the excess steam into the condenser after de-superheating. 3.0 SCOPE OF SUPPLY: 3.1 The requirement is for LP Bypass Valves comprising of combined Stop & Control valves mounted in a single valve body with respective Electro-hydraulic Actuators and a centralized Hydraulic Power Supply Unit (HPSU). Water injection valve(s) with actuator(s), flow nozzle(s) for measuring water injection quantity are also envisaged in the supplier's scope. The specifications for water injection valve(s) and flow nozzle(s) are separately envisaged. Accessories for valves e.g. hydraulic test device, steam blowing devices, accessories for hydraulic system e.g. flushing device, filling & gauging device for hydraulic accumulator and manually operated control fluid pump for filling of fluid in control fluid tank of HPSU shall also be in the supplier's scope. Desuperheating of downstream steam and Fire Resistant Fluid (FRF) may be or may not be in supplier's scope. Such requirements are clarified in input data sheet enclosed with the specification. Scope of supply with regard to other requirements e.g. special tools & tackles, commissioning spares, mandatory spares, supervision during erection and commissioning, connecting pipe, dump tube etc. shall be as per the input data sheet. 3.2 LP bypass valve with only one stem (single stem valve) is foreseen in some projects as per owner's requirements. In such cases, the valve is actuated for stop as well as control functions by its hydraulic actuator. This requirement is defined in the enclosed input data sheet.				
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सामग्री सूची संख्या INVENTORY NO. P-6301	REV. NO.02		निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11
			जांचकर्ता CHECKED BY	R.C. AGARWAL		16.4.11

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD		ST 47050	
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सामग्री सूची संख्या INVENTORY NO.	4.0 COMBINED LP BYPASS STOP & CONTROL VALVE: Valves are to be designed to meet the requirements as stipulated in the input data sheet. The supplier shall ensure that LP bypass valve design shall be capable to withstand thermal shocks occurring during operations.				
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	4.2 Valve Connections (For Piping) : Valve manufacturer shall also indicate the steam inlet & outlet connection sizes, material & the type of weld edge preparation inline with input data sheet for BHEL review and approval.				
	4.3 Valve Seat Tightness : Seat tightness of LP bypass stop and control valves shall be equivalent to block valve tightness confirming to MSS-SP-61.				
	4.4 Drain & Warm-up Connections: Location for warm-up Connection : To be provided at the lowest position of Stop Valve Location for Drain Connection : To be provided at the lowest position of Control Valve Drain connection size : Ø60.3X3.91 Warm-up connection size : Ø60.3X3.91 The supplier shall furnish drain & warm-up connection Size, Material and Weld edge detail for BHEL review and approval.				
स्वतंत्र अधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग एवं अनावरण केवल केवल के लिए ही सख्त प्रयोग, जो कि कंपनी के हित में संतुष्टिकारक हो न किया जाए।	4.5 Steam Strainer: Steam strainer is to be provided on Stop valve side and it is not mandatory for Control Valve side. It should be installed inside the valve casing in such a way that it renders trouble free, reliable and safe service and is also easy to carryout maintenance. Valve manufacturer is to furnish the detailed sectional view drawing indicating therein the strainer material, fitting details and also specify the pressure drop across the strainer.				
हस्ताक्षर एवं दिनांक SIGN & DATE	4.6 Noise Level: Maximum Noise Level: 85dB (A) at a distance of 1 meter from the body.				
सामग्री सूची संख्या INVENTORY NO.	4.7 General Valve Mounting Arrangement: Type of valve arrangement shall be in accordance with the input data sheet. The valve may be suspended type or pipe mounted as specified in the input data sheet. A typical arrangement of				
P-6301	REV. NO. 02		निर्माणकर्ता WORKED BY	SHUBHAM MITTAL	16.4.11
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SUPERSEDES INVENTORY NO. समशी सूची संख्या को अधिकतम करने वाली		vertically suspended valve is shown in the Appendix-1.					
		Valve manufacturer shall provide the valve support paws/brackets, which may be welded or integrally cast or fastened to the valve body. Details of the valve support paws/bracket shall be furnished at the time of offer. <i>In case of suspended type valve, frame for valve suspension and valve suspension arrangement shall be in BHEL scope.</i> Valve manufacturer shall furnish the General Arrangement drawing duly indicating therein the overall assembly dimensions, actuators dismantling space, total weight & must show the location of actuator oil connection and C.G (Center of Gravity) of the complete assembly.					
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		4.9 Other Requirements: The supplier to furnish leakage flow quantity through glands of stop & control valve for which pressure of 0.5 bar may be considered at the downstream. Size & material of the weld end for leakage flow connections shall be furnished. In case no leakage from valve glands for stop and control valve are foreseen in the design, specific confirmation for this shall be given in the offer.					
स्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है, प्रकाश प्रलेख एवं अप्रकाश रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।		5.0 INDIAN BOILER REGULATION: LP Bypass valves covered under this specification fall under the purview of Indian Boiler Regulation (IBR) and hence must satisfy all the conditions of IBR and the test certificate in IBR form III-C counter signed by an independent inspecting agency/authority approved by Indian Boiler Board shall be required. Assembly drawings of LP bypass valve shall be duly approved/countersigned by the IBR approved inspecting agency/authority.					
		6.0 LP BYPASS STOP & CONTROL VALVE ACTUATORS:					
हस्ताक्षर एवं दिनांक SIGN & DATE	28/4/11	6.1 LP Bypass Stop & Control Valve Actuators Schemes (Proposed): a) Sizing of actuators and all other elements such as Filters, Cartridge valves, check valves and throttle orifices etc. mounted on the control manifold of the respective actuators is in the supplier's scope. Servo-valves for control valve actuators shall act as an interface between the actuators and BHEL's control system, which shall position the control valves as per system requirement. The vendor may offer Servo-valve/ proportional valve as per their standard practice. The design of the Control Valve Actuator shall be such that in case of interruption of CF supply or the electrical signal, the LP bypass control valve shall remain "IN PLACE" during failure mode. For quick closing of stop valves, 2 nos. solenoid operated Poppet valves (TSV's) shall be supplied. Solenoid shall be with single / double coils as per supplier's standard practice and operation of coil(s) (simultaneous operation on both coils in case of double coils) of any one					
सूची संख्या INVENTORY NO.	P-6301	REV. NO. 02		निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11
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निर्माता एवं समीक्षक SIGN & DATE		उत्पाद मानक PRODUCT STANDARD		ST 47050	
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शीर्षक सूची संख्या INVENTORY NO.	TSV should affect trip. The Trip Solenoid valves shall be connected to protection system supplied by BHEL. All Solenoid Valves (Pilot Valves and TSVs) shall be rated for 25V±5V. All the valve actuators shall be capable of operating at 60°C control fluid temperature continuously. Refer proposed actuator schemes as per enclosed Appendix-3 & 4. However, Supplier will prepare their own schemes and submit the same for BHEL review and approval. b) In case of LP bypass valve with one actuator (Single stem valve), the applicable scheme as per Supplier's standard practice shall be submitted for BHEL review & approval. However a typical scheme is attached as per Appendix-5. c) All filters of actuators shall be equipped with differential pressure switches for alarm along with local indication for clogging. 6.1.1 Position Measurement of Valves: Each Stop Valve Actuator should be equipped with 4 Limit Switches (i.e. 2 for Open & 2 for Close position). Limit Switches shall be of mechanical type. Each Control Valve actuator should be equipped with non-contact type position transmitter for measuring the position of the Control valve. Details of the same shall be furnished along with the offer. The output of the Position Transmitter shall be 4 mA (valve fully closed) to 20mA (valve fully opened). 6.2 Operating Time: (a) For LP bypass stop & control valve (Double stem): (i) LP Bypass Stop Valve Actuator: Opening time : < 2 Seconds for full stroke (Against spring force) Closing time : = 1±10% Seconds for full stroke (With spring force) (ii) LP Bypass Control Valve Actuator: Opening time : < 2 Seconds for full stroke Closing time : < 2 Seconds for full stroke (b) For LP bypass valve (Single stem): In case of single stem valve actuator, the operating time shall be as follows: Opening time : < 2 Seconds for full stroke (Against spring force) Closing time : = 1±10% Seconds for full stroke (For emergency closure) Closing time : < 2 Seconds for full stroke (For modulating control) To adjust the opening and closing time of actuators, throttle orifices shall be provided wherever necessary.				
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स्वत्वधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत छोड़ो आंदोलन के अंतर्गत है। इसका प्रसारण एवं उपयोग केवल शीर्षक सूची संख्या के अंतर्गत ही होना चाहिए। अन्यथा इसे गोपनीय माना जाएगा।	हस्ताक्षर एवं तिथि SIGN & DATE				
शीर्षक सूची संख्या INVENTORY NO.	REV. NO.02	निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11
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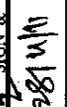
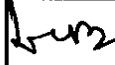
निम्नक एवं दिनांक SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 47050 पृष्ठ 28 का 10 Page 10 of 28		
सामग्री सूची संख्या INVENTORY NO	SUPERSEDES INVENTORY NO	6.3 Mounting Arrangement of Actuators: Type of arrangement required is specifically mentioned in the input data sheet. A typical arrangement of LP Bypass valve is shown in Appendix-1 for straight type of valves for which orientation of actuators shall be as follows: - Stop Valve Actuator : Vertical (Standing) - Control Valve Actuator : Vertical (Hanging) Incase of Angle type of valve arrangement , the Stop valve and Control Valve actuators shall be perpendicular to each other respectively. Supplier is to ensure & make provision for proper venting in the actuators for such angle type of valve arrangement. 6.3.1 Mounting Arrangement of Control Block for Actuators: The Control Block for each actuator shall be mounted on the Power Cylinder. EHA supplier shall ensure that supply and return line connections shall preferably be on the same side of the actuators as shown in the enclosed sketch (Appendix-1). 6.3.2 Actuator Control Fluid Connections: Supplier will ensure the flange end connections of supply & return pipelines as per sizes given below: - Supply Pipeline : Ø26.7X3.91, Material as per ASTM A312, GradeTP321 - Return Pipeline : Ø33.4X2.6, Material as per ASTM A312, GradeTP321 If the actuating medium used is MINERAL OIL of viscosity class as per ISOVG100 according to DIN51519 then supplier shall also make a provision for guarded pipeline connection as per size given below: - Guarded Pipeline : Ø88.9X5.49, Material Carbon Steel			
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.		6.4 Control Fluid (CF) Specification: (a) The Electro-hydraulic actuation (EHA) system shall be designed suiting to the control fluid medium as specified in the input data sheet. Total control fluid quantity comprising of quantities required for regular bypass system operation + flushing of the complete EHA system + sufficient quantity for one year make-up shall be worked out by the EHA supplier and informed to BHEL at the time of offer. (b) If specified in the input data sheet control fluid of required quantity shall be supplied by the supplier. The supplier shall furnish the specification and source of procurement for BHEL review and approval.			
स्वत्वाधिकार एवं गोपनीय इस प्रलेख में की गई सूचना भारत हेवी इलेक्ट्रिकल्स लि. की संपत्ति है इसका प्रयोग एवं आश्रय के बिना किसी भी तरह प्रयोग, उसे किसी अन्य व्यक्ति को देना या प्रसारित करना गैर कानूनी है।	निम्नक एवं दिनांक SIGN & DATE 28/11/11				
सामग्री सूची संख्या INVENTORY NO P-6301	REV. NO.02		निर्माणकर्ता WORKED BY SHUBHAM MITTAL	जांचकर्ता CHECKED BY R.C. AGARWAL	16.4.11 16.4.11

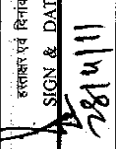
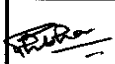
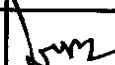
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सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.	6.5 CF Pressure & Temperature: - Normal operating pressure - 160 bar - Minimum operating pressure - 115 bar - Normal Control Fluid temperature - 50+5°C - Maximum Control Fluid temperature - 75°C 6.6 Control Fluid Tray for LP Bypass Valve Actuator (Vertically mounted): CF tray shall be provided to prevent CF falling on valve body in case of leakage & CF sensor shall also be provided in the CF tray to detect leakage for indication in control room. 7.0 HYDRAULIC POWER SUPPLY UNIT (HPSU): (Refer Appendix-2, Proposed) The Hydraulic Power Supply Unit (HPSU) is required for actuation of LP Bypass Stop & Control Valve Actuators and water injection valve actuator(s) (if hydraulically actuated water injection valve(s) are envisaged in applicable specification). The EHA supplier, suiting to the control medium as specified in the input data sheet, shall do the design & sizing of HPSU. HPSU will consist of all necessary components like CF pumps, filters, hydraulic accumulators, check valves, pressure & temperature measuring instruments, Level measuring instruments, filtration-cum-cooling unit and regeneration unit for Control Fluid (CF) purification. Supplier to ensure that all the surfaces coming in contact with control fluid including control fluid tank shall be made of stainless steel. The Control fluid (CF) tank shall be adequately sized to accommodate total system quantity of fluid including fluid contained in pressure lines, return lines, actuators & hydraulic accumulators etc. Suitable provision for vapor extraction shall be provided by the supplier in the CF tank. Two nos. CF Pumps shall be provided in the CF tank with their pressure and flow control valves and shall be immersed into the CF medium in the CF tank. The electric motors of CF pumps and the pressure control valves for system pressure adjustment shall be mounted on the CF tank cover. Two CF pumps are required in the HPSU, one of that can be pre-selected for operation, whereas the other shall act as standby, operation of which shall be automatically switched over in case of any fault. Changeover of pumps shall take place depending on the CF pressure as well as outage of the working pump motor. Control of Pumps & cooling circuit will be realized in BHEL's control system. Pumps are to be designed by the HPSU supplier as pressure-controlled pumps, which shall maintain the constant pressure to a constant preset value i.e. 160bar and shall regulate the CF quantity according to the demand. Pressure surges/pulsations are required to be dampened by bladder type hydraulic accumulators, which will also ensure that the system pressure does not collapse. Accumulators shall ensure positive supply of oil to hydraulic actuators even when hydraulic oil pumps are not available. Accumulators shall be adequately sized to ensure supply for at least two complete stroking operations of all connected actuators. Sizing of the accumulators shall be done by the HPSU supplier and supplier shall decide the quantity & capacity of accumulators for reliable operation of the actuators.				
सामग्री सूची संख्या INVENTORY NO.	REV. NO. 02	निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11	
सामग्री सूची संख्या INVENTORY NO.	REV. NO. 02	जांचकर्ता CHECKED BY	R.C. AGARWAL		16.4.11	

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सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.	Two nos. separate cooling-cum-filtration circuits (filtration rate of return line filters is 3μ absolute) shall be provided in order to maintain the cleanliness of the system and to ensure proper cooling. Separate AC driven circulation pumps with 2X100% capacity shall be provided to pump CF into these circuits. 2X100% coolers shall be provided for cooling of CF. The fans of the coolers shall cut in and out depending upon the CF temperature. The circulation pumps shall also pump CF into the regeneration circuit, which shall be equipped with filter (12μ) for continuous filtration of the CF. (Applicable if CF is used). Cooling by air shall be foreseen if the ambient temperature is up to 49°C. For ambient temperature more than 49°C, cooling with water shall be foreseen. Water quantity & quality requirements shall be furnished by the supplier along with the offer for arranging the same by the purchaser. Provision of heater for heating the control fluid shall be kept for projects where ambient temperature goes up to 5°C and below. The HPSU supplier shall mount a console containing local pressure gauges, pressure switches & nipples for commissioning measurements on the CF tank. Moreover, coarse filters with contamination indicator & pressure relief valves for pump protection are to be provided by the supplier. The complete HPSU shall be housed inside the cabinet and for emergency manual tripping, a switch shall be provided on the terminal box. HPSU Circuit diagrams drawn on either metallic or plastic sheet in color should be riveted inside the door panel. Supplier is to make an arrangement for mounting electric lamps inside the housing. The HPSU supplier shall provide 03 no. pressure line and 03 no. return line connections in HPSU as per the following details: 01 no. each of pressure and return line connections for LPBP stop & control valve no.-1. 01 no. each of pressure and return line connections for LPBP stop & control valve no.-2. 01 no. each of pressure and return line connections for water injection valve(s). In case the water injection valve(s) are with pneumatic actuators only 2 no. of pressure and 2 no. of return line connections shall be applicable as mentioned at sl. no. a) & b) above. 7.1 Electric Wiring: Electrical wiring of all the hydraulic assemblies is part of the supplier's scope of supply. It includes measuring & signal devices. All electric components must be wired up to junction box (JB) of the unit. The JB will have IP55 degree of protection. A separate JB meant for pump motors connection shall also be provided. No internal wiring shall be done by BHEL inside the HPSU housing cabinet. JB wiring diagram along with data of all the electrical equipment as mounted on HPSU & as well as on control block of Actuators, Position measuring instruments and cable termination details must be supplied along with the main equipment. Internal wiring to JB must be housed in protective channels of galvanized sheet metal with removable covers. Steel-clad hose/conduit must protect the connecting cable to individual components. The length of free cables (i.e. at plugs or connections) should not be longer than 500mm. Protective devices for wiring should also be supplied for equipment, which is not wired (i.e. motors, solenoid valves), ending at the appropriate location of the base frame.			
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स्वत्वधिकार 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 28/4/11					
सामग्री सूची संख्या INVENTORY NO. P-6301	REV. NO. 02		निर्माणकर्ता WORKED BY जांचकर्ता CHECKED BY	SHUBHAM MITTAL R.C. AGARWAL	16.4.11 16.4.11

दिनांक एवं स्थान SIGN & DATE		उत्पाद मानक		ST 47050		
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SUPERSEDES INVENTORY NO.	7.1.1 Instruments in HPSU: (a) Pressure transmitter is to be provided at the discharge of each CF pump and also in the CF header. All pressure transmitter to be 'SMART' type with HART protocol. (b) All filters to be equipped with differential pressure switches for alarm along with local indication for clogging. (c) Suitable pressure switches and gauges to be provided in HPSU. (d) Two (2) nos. Resistance temperature detectors along with temperature transmitters to be provided for measuring the temperature in the tank. (e) Suitable level gauges & three (3) no. level transmitters to be provided on the CF tank for level measuring. (f) Contact rating of all the switches to be furnished. (g) Number & type of instruments shall be subject to BHEL approval. Complete instrument list showing range, model no. and set point of various instruments shall be furnished for BHEL approval.					
7.1.2 Interface with BHEL's System: Signals from the instruments shall be processed in BHEL's system & commands from BHEL's control system shall go for controlling the motors, fans etc in the HPSU and also the Pilot valves, Servo-valves/proportional valve and TSVs in the valve actuators. Supplier is to furnish the recommended operation logics for the entire system enabling BHEL to develop suitable control schemes. (a) For operation of Control Valves, BHEL shall supply $\pm 7.5 \text{ mA} / \pm 30 \text{ mA}$ signal to servo-valves/ proportional valves from its DCS. (b) In case vendor system is not able to accept this signal, 4-20 mA demand signal can be furnished by BHEL. In such a case suitable positioner shall be supplied by the vendor for interfacing with servo-valve / proportional valve. In this case, final operation of all the components of actuators (stop valves, control valves and water injection valves), i.e. TSVs, Pilot valves and interlocking valves shall also be from vendor's system. Suitable signals shall be provided from BHEL's DCS for control of these elements. Necessary software for calibration / parameterization of the positioner shall also be supplied.						
7.1.3 Power Supply: Power supply requirements for all 3 phase motors shall be 415V$\pm$10% AC. In case of different requirement the same shall be specified in the input data sheet.						
7.2 Coating, Cleaning and Preservation: Supplier shall furnish the colour scheme for BHEL review and acceptance. Before preservation, the interior surface of the HPSU must be cleaned thoroughly. Before delivery of HPSU, the unit should be coated inside with hydraulic fluid containing a suitable inhibitor. Additives used must not degrade the quality of hydraulic medium. All external connections must be sealed with metal plugs. All items as listed in the supplier's part list have TAG nos. & must have nameplates, which shall be attached in such a way so that they can be seen & read easily. Nameplates must be designed 10X50 mm with 7-mm inscription height & mounted by notch spikes.						
शीर्षक एवं संख्या INVENTORY NO.	स्वतंत्रता एवं गोपनीयता इस दस्तावेज में दी गई सूचना भारत की इलेक्ट्रिकल की संपत्ति 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	REV. NO. 02	निर्माणकर्ता WORKED BY	SHUBHAM MITTAL	16.4.11
P-6301	28/4/11	[Signature]	जांचकर्ता CHECKED BY	R.C. AGAWRAL	[Signature]	16.4.11

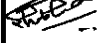
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सामग्री सूची संख्या INVENTORY NO.	8.0 TOOLS & TACKLES: The bidder shall submit with the equipment one complete set of all special tools & tackles & other instrument required for site erection & commissioning, assembly, disassembly & proper maintenance of the LP Bypass system. The bidder along with the offer shall submit a list of such tools and tackles. In case, new requirement of any special tool arises during installation of LP bypass system equipments the same shall be supplied by the supplier free of cost.				
सामग्री सूची संख्या को अधिकारिता करता	9.0 MATERIAL & SURFACE PROTECTION: 9.1 Material Selection The materials for all components must be for maximum corrosion resistance under the prevailing ambient conditions. The material utilized for manufacture of various components shall be those, which are already established for use in such applications. Material of all the major items of LP Bypass valves, actuators & HPSU shall be informed during offer stage for purchaser's acceptance. However, during detailed engineering stage if it is established that the materials as informed by the bidder is inferior to present practices, the supplier without any commercial implications shall change it.				
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.	9.2 Material Testing: Product forms for load-bearing parts shall be supplied with Inspection Certificate 3.1 B as per EN10204 . The product forms for other parts shall be specified in the parts list including bill of material, indicating therein the material number and the standard, including trade names if necessary.				
स्वतंत्राधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग को कि कम्पनी के हित में संश्लेषणक हो न किया जाए।	9.3 Welding Materials & Consumables: The properties of welding materials and consumables to be employed (mechanical, chemical, thermal, long term performance etc.) shall be matched to the base metal. The supplier shall ensure that the welding materials and consumables have National/International approval for the intended application. For site erection purpose, the supplier shall submit to the purchaser the Field Welding Schedule (FWS) for field welding activities. The FWS shall be submitted to the Purchaser/Owner along with all supporting procedures, like welding procedures, heat treatment procedures, NDT procedures etc., at least 30 days before schedule start of erection work at site.				
हस्ताक्षर एवं दिनांक SIGN & DATE	9.4 Welder Qualifications: For the work to be performed only those welders shall be used who are qualified as per DIN EN287-1 or per any comparable Indian/International standard for metals to be welded and the welding procedure to be employed.				
सामग्री सूची संख्या INVENTORY NO.	REV. NO. 02	निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11
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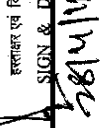
दिनांक एवं हस्ताक्षर SIGN & DATE				उत्पाद मानक PRODUCT STANDARD		ST 47050 पृष्ठ 28 का 15 Page 15 of 28	
सामग्री सूची संख्या INVENTORY NO. को अभिलेखित करना		10.0 FUNCTIONAL & TESTING REQUIREMENTS: (Refer Format-1, APPENDIX-6) Supplier shall furnish & specify the various functional & test requirements of LP Bypass valves, Actuators & HPSU in the prescribed format as enclosed and submit the same for BHEL approval. The supplier shall also furnish copies of the reference documents/their standards/acceptance norms/tests & inspection procedure etc. as specified in the format-1. Without approval of functional & testing requirements, the supplier will not start manufacturing. This document shall form a part of the contract. BHEL/Owner shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of the BHEL/Owner's Engineer or his authorized representative and beyond which the work will not proceed without consent of Purchaser/Owner/Authorized representative in writing. Following functional tests are to be carried out at supplier works: 1. HPSU testing as per suppliers approved test procedure 2. LP Stop & Control Valve Actuators testing without bypass valve as per supplier's approved procedure 3. Cv test (type test) of LP Bypass Valve without actuators: (i) Cv test will be carried out for LP Bypass valve as per ISA 75.02 and test report shall be submitted for BHEL approval. The Cv test can be carried out physically on the valve or through computer simulation. (ii) The Cv test shall be carried out in presence of the BHEL representative, for which minimum 30 days notice shall be given by the supplier. The supplier shall obtain the BHEL approval for the Cv test procedure before conducting the Cv test. The Cv test procedure shall clearly specify the test set-up, instruments to be used, procedure, acceptance norms, recording of different parameters, interval of recording, precautions to be taken etc. for the Cv test to be carried out. (iii) In case test report is already available on the same model/type/size/rating of the valve as proposed to be supplied under this contract and the Cv test have been either conducted at any independent laboratory or have been witnessed by a client, the same can be considered if Cv test have been carried out not more than 5 years from the date of bid opening. (iv) In case the offered valve is already in successful operation using the same valve body, seat and trim combination as of the offered valve, the vendor may furnish the name of project, data sheet, cross sectional drawing of that valve for review in lieu of the Cv test report. 4. NDT of castings/forgings: (a) The ultrasonic test shall be carried out as follows: I. Forgings conforming to quality level-4 as per EN 10228-3. II. Castings conforming to the following requirements as per EN 12680-2: (i) All the weld seams, high stress areas and sealing surfaces shall conform to quality level-I. (ii) Rest of the casting shall conform to quality level-II.					
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दिनांक एवं हस्ताक्षर SIGN & DATE 		सामग्री सूची संख्या INVENTORY NO. P-6301					
REV. NO. 02				निर्माणकर्ता WORKED BY SHUBHAM MITTAL		 16.4.11	
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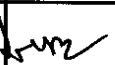
निम्नक एवं दिनांक SIGN & DATE				उत्पाद मानक PRODUCT STANDARD		ST 47050 पृष्ठ 28 का 16 Page 16 of 28	
सामग्री सूची संख्या INVENTORY NO.		SUPERSEDES INVENTORY NO.		(b) WPS & PQR shall be got approved by BHEL, before start of welding on weld seams. (c) Stress relieving shall be performed after welding. The vendor shall report the hardness survey of the heat affected zone (HAZ), weld and parent materials. (d) All the weld seams shall be radiographically tested conforming to quality level-I as per ASTM E446. 5. Hydrostatic body test of LP bypass valve in accordance with ANSI B-16.34 prior to seat leakage test. 6. Valve closure test and seat leakage test in accordance with ANSI B-16.34 and as per the leakage class MSS SP61. 7. LP Bypass valves testing along with actuators in assembled condition. 8. Functional test: The fully assembled valves including actuators control devices and accessories shall be functionally tested to demonstrate times from open to close position. Any additional requirement, if any, shall be separately specified in the purchase order. In general, highest quality of workmanship shall be ensured while manufacturing and assembly of LP Bypass valves, their actuators and HPSU. 10.1 TEST CERTIFICATES: Supplier has to furnish the Test Certificates, Material Certificates; certificates for weld examination, leakage test, hot tensile tests etc before delivery. 11.0 SPARES: 11.1 Commissioning & Startup Spares: Spare & wear parts are included in the scope of supply up to completion of trial operation. The supplier shall prepare lists of all probable spares and wear parts, which indicate the recommended quantities and clear parts identification. The parts shall be manufactured in accordance with the requirements of this specification. (1) It will be the responsibility of the supplier to provide all commissioning and startup spares required for initial operation till the satisfactory completion of the Trial Operation. The supplier to ensure that no hold ups shall occur at site during erection & commissioning due to non-availability of commissioning spares. The supplier shall furnish a list of all such spares within 60 days from the date of Letter of award & such list shall be reviewed by the purchaser/Owner & mutually agreed to. List of commissioning spares shall include 1 set each of all those items which may get damage during transportation/storage such as receptical connectors & other items e.g. gaskets, packing rings, filters etc. (2) These spares will be received & stored by the purchaser at least 3 months prior to the date of commencement of trial operation & utilized as and when required.			
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निम्नक एवं दिनांक SIGN & DATE 		निम्नक एवं दिनांक SIGN & DATE 28/11/11		REV. NO. 02			
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समीची सूची संख्या को SUPERSEDES INVENTORY	11.2 Mandatory Spares: The bidder shall submit their commercial offer separately for the mandatory spares as per the list furnished by the Purchaser/Owner. List of mandatory spares furnished by the bidder shall be duly correlated with their bill of material.			
COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of this company.	11.3 Recommended Spares: In addition to the mandatory spares, the bidder is required to submit as part of the contract, a complete list of recommended spare parts, for the equipment supplied based on his experience, which are essential for a plant operation of ten (10) years. In the offer, the bidder is required to furnish item wise price and total lump sum price. The purchaser is free to order these recommended spare parts at any time. The bidder shall also indicate the service expectancy period for the spare parts under normal operating condition before the replacement is necessary. All categories of spares to be supplied under this contract shall be strictly interchangeable with the parts for which they are intended for replacement. The spares shall be treated and packed for long storage under the climate conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic bags with desiccators packs as necessary.			
	Each spare shall be clearly marked or labeled on the outside of the packing with its description and assembly parts number.			
स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में कोई सूचना भारत डीपी इलेक्ट्रिकल्स की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न	11.4 General Technical requirements for Spares: (i) All the mandatory spares covered under the contract shall be manufactured along with the main equipment as a continuous operation and the delivery of the spares will be affected along with the main equipment. In case of recommended spares the above will be applicable provided the order for the recommended spares have been placed with the supplier prior to commencement of manufacture of the main equipment. (ii) The quality plan and the inspection requirement finalized for the main equipment will also be applicable to the corresponding spares. (iii) The bidder will submit along with the offer the manufacturing drawings, catalogues, assembly drawings and any other document to identify the recommended spares. (iv) The supplier will provide the purchaser with all the addresses and particulars of his sub-vendors while placing the order on them for items/components/equipment covered under the contract. He will further ensure that the purchaser/Owner if so desires will have the right to place order for spares directly on his sub-suppliers on mutually agreed terms based on their offers.			
समीची सूची संख्या INVENTORY NO. P-6301	दिनांक एवं हस्ताक्षर SIGN & DATE 28/11/11	REV. NO. 02	निर्माणकर्ता WORKED BY SHUBHAM MITTAL	16.4.11
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SUPERSEDES INVENTORY	सामग्री सूची संख्या को	12.0 PROCESSING & DOCUMENTATION: It is the duty of the system supplier to clarify interfaces and good cooperation with their sub-suppliers of products that interface with his scope of supply, both in the planning phase as well as on site. The supplier will be notified in writing in the event of any changes (additions or deletions) in the scope of supply and services, with written confirmation to follow on the part of the purchaser. The written confirmation does not constitute acceptance of the indicated additional or reduced costs. All major functional and mechanical design decisions shall be made together with the purchaser as per mutually agreed meeting schedules. 12.1 Processing Documents: All verification analysis, which demonstrates compliance with design warranted & specified data and which include information on interface to adjacent systems shall subsequently be designated processing, documents and shall be submitted to the purchaser for review. Verification analysis required by legislative bodies, regulatory authorities or similar entities of this nature should also be treated as processing documents. The documents to be reviewed by the purchaser or his authorized representative are listed in Section 14.2 & 14.3 below. The purchaser or designated authorized inspectors can also demand to see the documents or verification analysis to be submitted for preliminary review. All documents shall be reviewed by the supplier before being submitted unsolicited to the purchaser /authorized representative. Fabrication/Manufacturing may begin only after the submission of approved documents by the purchaser. The supplier shall check the drawings provided for parts from outside vendors for any interface with his own parts at his own end. The supplier shall also finalize all type of interface activities with their own sub-vendors. The supplier shall be held responsible for any mistake done during detailed engineering or manufacturing by their sub-vendor. The extra cost incurred due to this interface shall be borne by the supplier. The lists and schematic diagrams for instrumentation and open- and closed loop controls if prepared by the supplier shall be thoroughly checked by the supplier for completeness and correctness. All necessary drawings, detailed drawings and spare parts drawings shall be prepared using computer- based drawing programs. These must be deposited finally to the purchaser on disk and must be "AutoCAD" compatible. The required scope of documentation is established in the scope of supply. All documents shall be prepared in the project-specific language stipulated. In all instances, project-specific requirements must be duly noted and complied with when preparing & identifying the documents. The purchaser shall be made aware of all changes in the supplier's drawings by pointing out the revision remarks and indices on them is not sufficient. Physical parameters and drawing dimensions shall be given in metric units in accordance with Indian Standards.			
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दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	REV. NO. 02	निर्माणकर्ता WORKED BY	SHUBHAM MITTAL	16.4.11
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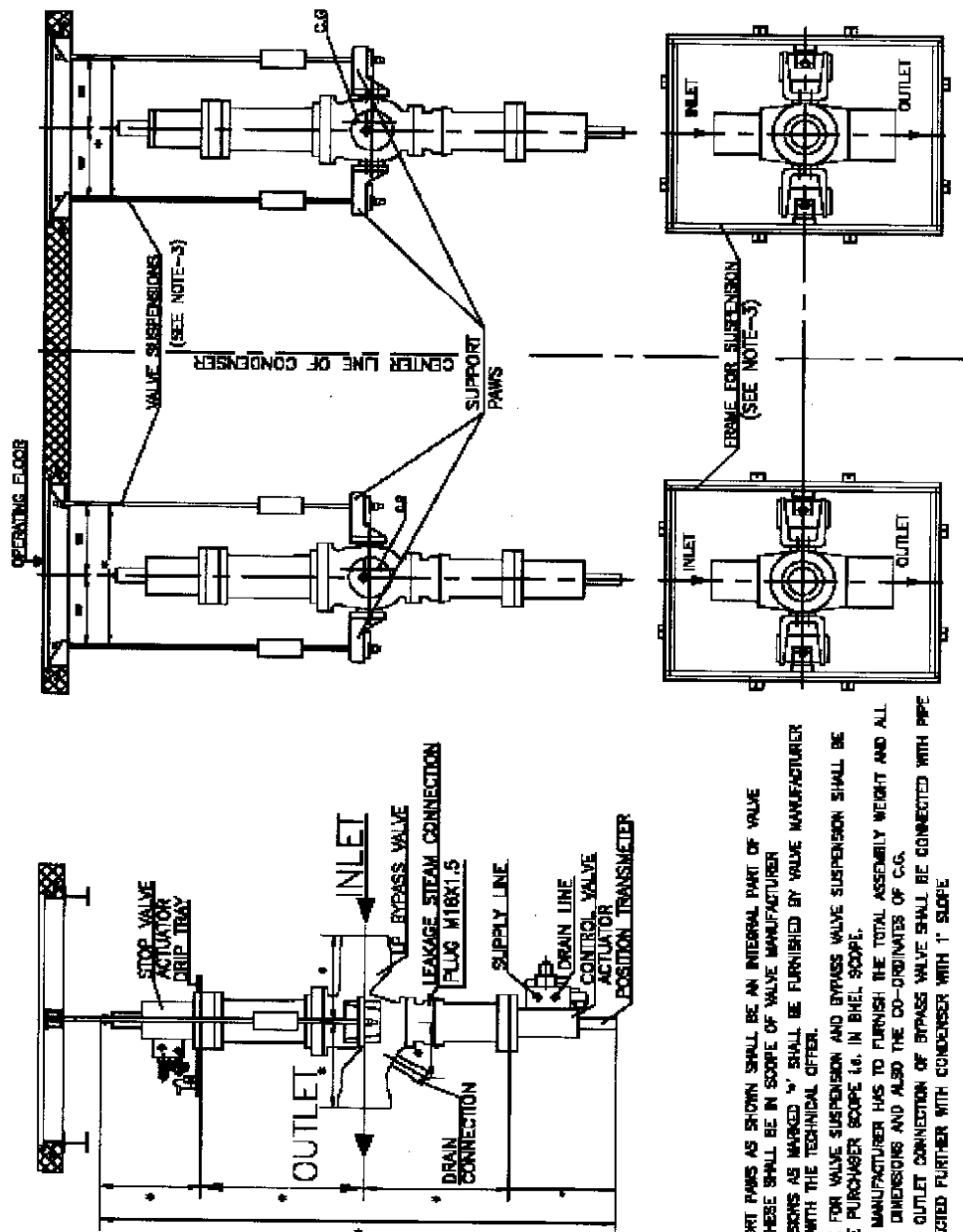
नाम एवं दिनांक SIGN & DATE		उत्पाद मानक PRODUCT STANDARD		ST 47050		
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सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.	12.2 Review Documents: Following drawings and data are to be furnished along with the technical offers in triplicate . 12.2.1 Documents related to HPSU: 1. Schematic circuit diagram showing connection of HPSU with respective bypass actuators & Sizing calculation of HPSU & its main components. 2. General arrangement drawing of HPSU indicating therein the total assembly weight, overall major layout dimensions, foundation detail, space requirement for maintenance, Flanges end connection detail and their material. 3. Schematic diagram duly indicated with all item nos., Tag Nos. and legends. In this diagram, tank capacity, pump capacity of each CF Pumps, Circulation Pumps, rated power consumption of each pump motor, filtration rating of each filter and capacity of each Hydraulic Accumulators has to be specified. 4. Part list duly indicated with item no/Position No., quantity, catalogued / Drg. reference no. & source of procurement etc. BHEL will indicate their TAG nos. against each item for identification purpose and submit the same to the supplier for necessary updation. 5.* HPSU Test procedure duly indicating therein the test detail & their acceptance norms. 6. Data sheets & *functional description of all individual items. Electrical wiring diagram. 7.* Operation, Maintenance & Erection manual. 8.* Field Weld Schedule and erection instruction for site engineers. 9.* List of Bought out items, the source of procurement has to be specified for each item. 10. List of recommended and commissioning spares. 11. Detailed 'Quality Plan' for HPSU. (See Clause no. 10.0) 12.2.2 Documents related to LP Bypass Valves & Actuators: 1. Overall General arrangement cross-sectional assembly drawing with all major dimensions required from layout point of view. Steam Inlet & Outlet weld edge sizes, bracket for Valve suspension arrangement, and location of center of gravity and also total assembly weight has to be specified in the drawings. Bill of material (BOM) of the valve with actuator assembly has to be tabulated. Assembly & disassembly maintenance space dimensions should be indicated in the drawings. 2. Separate Stop & Control Valve actuator drawings indicating therein the flange end connection detail, total actuator weight, overall dimension & dismantling space requirement. All items should be marked and listed in the BOM on the drawing itself. On the actuator drawings, schemes for Stop & Control valve actuator should also to be shown schematically. 3.* Catalogs and technical literature of Solenoid valves, Servo-valves, proportional valves, Position transducer, Positioners, Limit Switches, Relief Valves etc. 4. Sizing Calculation for Bypass valves & actuators. 5. Valve Data Sheets for LP Bypass Valve 6. List of special tools (if any)				
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सामग्री सूची संख्या INVENTORY NO		7. Valve characteristics - Lift vs Area ; Lift vs Flow - Pressure vs flow (upstream side/ down stream side) 8.* Part list of Valves, Actuators. BHEL will indicate their Tag nos. against each item and the same shall be submitted to the supplier for necessary updation. This is required for identification purpose. 9. List of Recommended & Commissioning spares. The supplier along with the main equipment shall supply commissioning spares for Valves, Actuators & HPSU. 10.* Valve & actuator test procedure. Test log sheets for valves and actuators. 11. Detailed QP for combined LP Bypass Stop & Control valves and their actuators. 12.* List of Instruments duly indicated with BHEL Tag Nos., service, set points, range & make etc. to be furnished. 12.2.3 Documents related to Water Injection Valves & Actuators: 1. Data sheets of valve & actuator indicating therein all parameters & material details. 2. General arrangement drawing of valve with actuator indicating therein major dimensions, dismantling dimensions & assembly weight. Bill of material must be tabulated on the assembly drawing. 3. Pneumatic/ Hydraulic actuator scheme (as applicable) indicating therein part numbers. 4. Part List of valve actuator. 5. Drawing for valve & actuator coupling arrangement. 6. Sizing calculation for valve & actuator. 7. Curve for water mass flow vs. % lift (indicating % lift at max. design water mass flow & min. controlled water mass flow). 8. Data sheets for all the items mounted on the control manifold. 9. Wiring diagram for electrical items. 12.2.4 Other Documents related to C & I: 1. Flow Nozzle data sheet as per ISO 5167. 2. Flow Nozzle drawing. 3. Flow Nozzle characteristic curve between differential pressure and flow (indicating calculation formula also). 4. List of Instruments (HPSU and Actuators) duly indicated with KKS Tag Nos., type, service, set points, range & make etc. 5.* Consumer list, Drive list, Signal I/O List. 6.* Recommended system logics/write-up. 7.* Electrical Terminal Wiring Details (HPSU Junction Boxes/Positioners and other components) 8.* Cabling Layout Diagram. 9.* Electro-pneumatic positioner catalogue (If applicable). 10.* Instruments Catalogues and data sheets of all electrical components. 11.* Separate feeder load list to be furnished, giving details of Power Supply, KW rating, Current drawn etc. for various motors, fans and other electrical drives. Note: “*”- These documents are required separately after placement of order.					
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निर्माक एवं दिनांक SIGN & DATE 		REV. NO. 02					
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SUPERSEDES INVENTORY NO.	श्रमजी पूरवी संख्या जो अधिकतमि उत्तरा	Documents as sent along with the technical offer shall be scrutinized and finalized at BHEL end and the same shall be sent to the supplier for furnishing the final copy in triplicate after incorporating all comments, if any, in their drawings/documents for final approval. One copy of the final document shall be sent to the suppliers for their own record and reference. Order shall be placed on the supplier only after freezing all the technical points mutually. 25 hard copies & 3 soft copies on CD of the O&M manual and all other relevant documents shall be furnished by the vendor in the event of ordering. Out of 25 hard copies of O&M manual, 3 copies shall be kept with the equipments for ready reference & use at site and remaining 22 copies along with 3 soft copies on CD shall be sent to BHEL, Hardwar 10 weeks in advance prior to dispatch of equipment. 13.0 MARKING: - All items shall be attached / fixed with a metal identification plate indicating thereon the tag number as per schemes, equipment title & main parameters of the equipment. - All the final documents shall bear the following identification markings: - Component manufacturer's name - Name of Power Plant - Item Description - Purchaser Name - BHEL P.O. No. - Revision index for documents 14.0 PACKING & TRANSPORTATION: (a) All the equipment shall be suitably protected, coated or boxed (sea worthy packing) and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The bidder shall provide the site storage instruction applicable for the equipment after it arrives at the site. Lifting points & lugs shall be clearly identified. (b) Painting scheme along with relevant technical details for all the offered equipments shall be furnished by the supplier with the offer for review and approval by BHEL. (c) Supplier shall intimate shipping/dispatch plan of the offered equipment including details of each boxes & sub boxes to the purchaser at least 2 months prior to dispatch. One complete set of packing list duly indicating therein the detail of all items, should be placed inside the packing box for material verification at site and three copies of the same should be forwarded to the purchaser for their advance information & record. In case, there is any change in the shipping plan the same shall be informed to the purchaser well in advance.			
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P-6301	जांचकर्ता CHECKED BY		R.C. AGARWAL		16.4.11

दिनांक एवं हस्ताक्षर SIGN & DATE			उत्पाद मानक PRODUCT STANDARD		ST 47050 पृष्ठ 28 का 22 Page 22 of 28	
शपथी सूची संख्या को अधिकृत किया	SUPERSEDES INVENTORY NO	15.0 SUPERVISION DURING ERECTION-COMMISSIONING & TRAINING AT SITE: The supplier shall depute their representative at project site for erection & commissioning supervision. The lump sum charges for site supervision shall be included in the main offer for which the supplier has to provide the justification in the offer. The supplier shall conduct minimum 2 days training program at site regarding design/construction features, operation & maintenance of the supplied equipments (including C&I) for customer engineers and BHEL engineers during erection and commissioning. Schedule of the program shall be mutually agreed between supplier and customer/ BHEL engineers. The vendor to clearly indicate the extent of association of their service engineer during erection and commissioning of the supplied equipments at site in their offer. Further special instructions which are required to be followed at site during erection and commissioning shall be furnished by the vendor as per the schedule mentioned in the enclosed MDL. 16.0 GUARANTEE: The complete unit shall be guaranteed for 24 months of trouble free performance from the date of shipment or 18 months from commissioning date whichever is earlier. Incase of any failure or trouble reported from site, the supplier would depute their representative immediately to attend the problem and replace the defective component/parts if required. 17.0 PRICE: The supplier is to furnish the price against each assembly separately for the scope of supply as indicated in the input data sheet. 18.0 LIST OF CROSS REFERRED DOCUMENTS: - ASTM A312; DIN51519; EN10204; DIN EN287-1, EN 10228-3, EN 12680-2, ASTM E446.				
COPYRIGHT AND CONFIDENTIAL. The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company						
स्वत्वधिकार एवं गोपनीय दृष्टा प्रलेख में की गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।						
उत्तराक्षर एवं दिनांक SIGN & DATE	28/4/11					
शपथी सूची संख्या INVENTORY NO	P-6301	REV. NO. 02		निर्माणकर्ता WORKED BY	SHUBHAM MITTAL	16.4.11
				जांचकर्ता CHECKED BY	R.C. AGARWAL	16.4.11

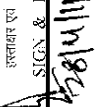
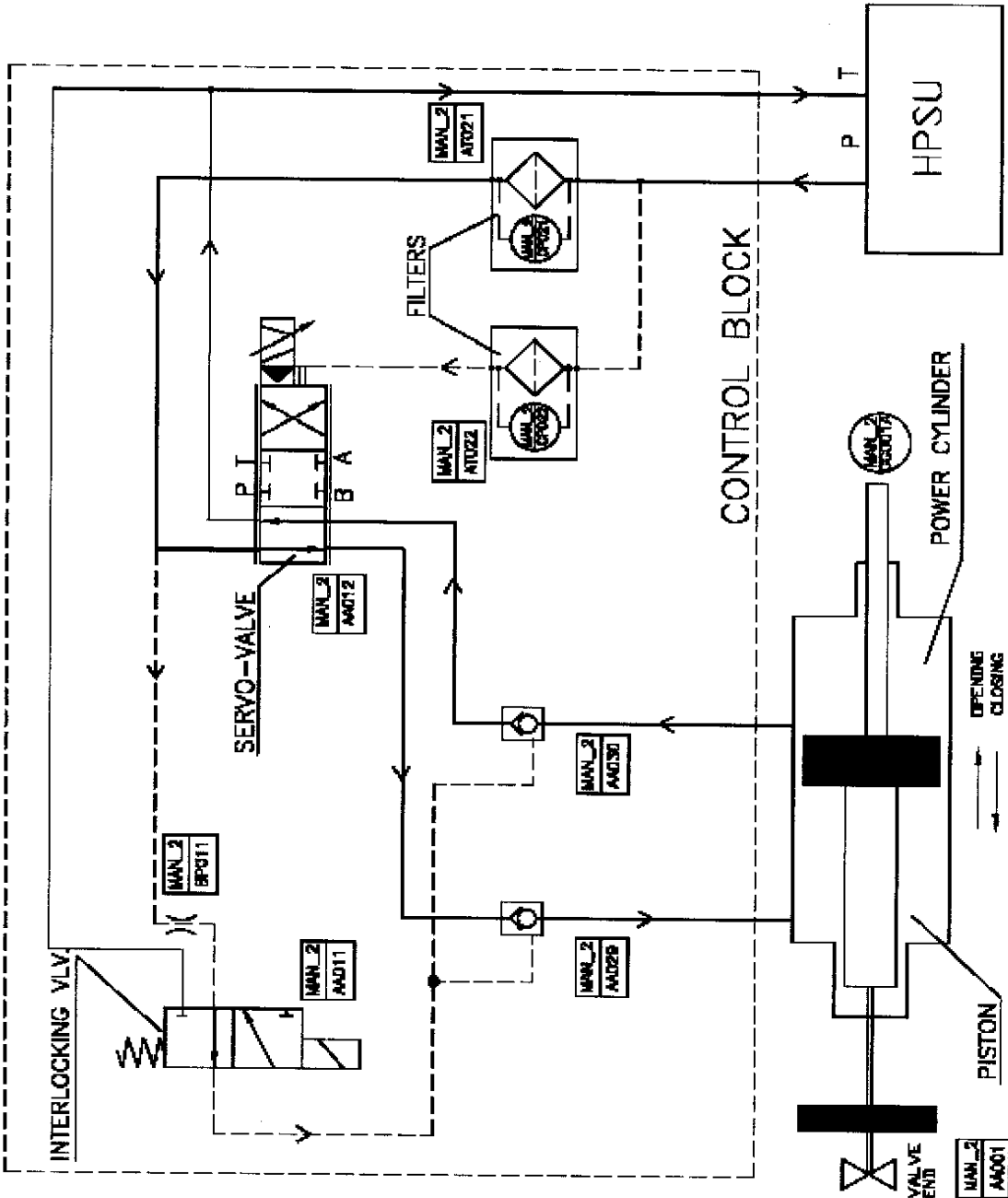
सामग्री पुरी संख्या INVENTORY NO. P-6301	हस्ताक्षर एवं दिनांक SIGN & DATE 28/11/11	स्वतंत्राधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रयोग या अपरव्यवहार बिना इस दिक्ती की तब तक बर्बरक की बिना न किया जाए :	COPYRIGHT AND CONFIDENTIAL The information on this 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	सामग्री सुरक्षित रखनी को अधिकारित व्यक्ति SUPERSEDES INVENTORY NO.	दिनांक एवं हस्ताक्षर SIGN & DATE
REV. NO. 02					
				उत्पाद मानक PRODUCT STANDARD	ST 47050 पृष्ठ 28 का 23 Page 23 of 28
निर्माणकर्ता WORKED BY SHUBHAM MITTAL जांचकर्ता CHECKED BY R.C. AGARWAL	16.4.11	16.4.11	APPENDIX-1 GENERAL ARRANGEMENT OF LP BYPASS VALVES (TYPICAL)		



NOTE :

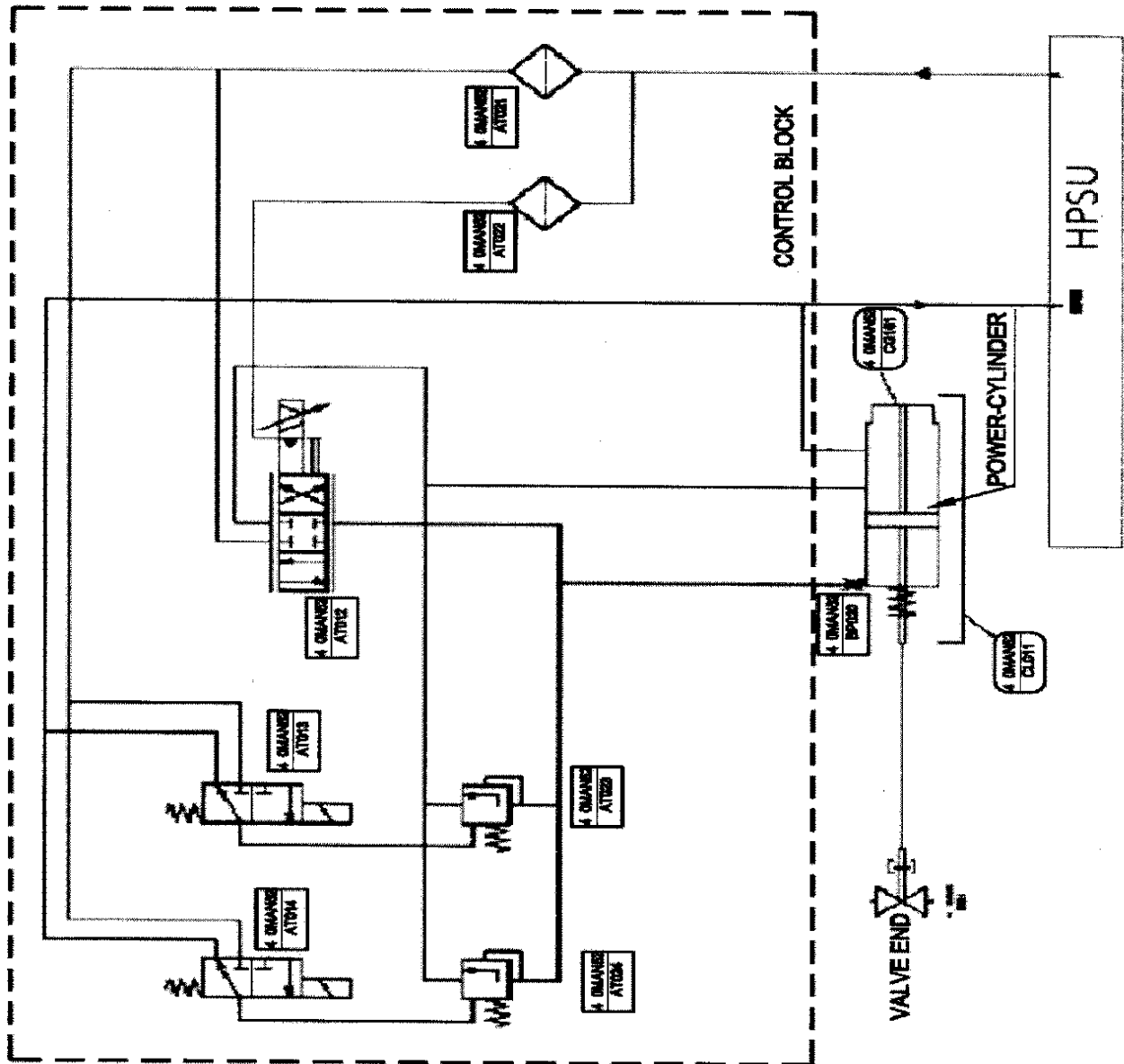
1. SUPPORT PAWS AS SHOWN SHALL BE AN INTERNAL PART OF VALVE AND THESE SHALL BE IN SCOPE OF VALVE MANUFACTURER
2. DIMENSIONS AS MARKED "A" SHALL BE FURNISHED BY VALVE MANUFACTURER ALONGWITH THE TECHNICAL OFFER.
3. FRAME FOR VALVE SUSPENSION AND BYPASS VALVE SUSPENSION SHALL BE IN THE PURCHASER SCOPE I.E. IN BHEL SCOPE.
4. VALVE MANUFACTURER HAS TO FURNISH THE TOTAL ASSEMBLY WEIGHT AND ALL MAJOR DIMENSIONS AND ALSO THE CO-ORDINATES OF C.G.
5. STEAM OUTLET CONNECTION OF BYPASS VALVE SHALL BE CONNECTED WITH PIPE CONNECTED FURTHER WITH CONDENSER WITH 1° SLOPE

शारीरी सूची संख्या INVENTORY NO. P-6301	हस्ताक्षर एवं दिनांक SIGN & DATE 28/11/11	स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भर्तृ के अतिरिक्त किसी तीसरे व्यक्ति को प्रकट नहीं की जायेगी, जो कि कंपनी के हित में हानिकारक हो न कि या अन्य। अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न कि या अन्य।	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.	शारीरी सूची संख्या और अतिरिक्त संख्या SUPERSEDES INVENTORY NO.	दिनांक एवं हस्ताक्षर SIGN & DATE	REV. NO. 02	उत्पाद मानक PRODUCT STANDARD ST 47050 पृष्ठ 28 का 24 Page 24 of 28 APPENDIX-2 HYDRAULIC POWER SUPPLY UNIT FOR LP BYPASS SYSTEM (TYPICAL)		
निर्माणकर्ता WORKED BY SHUBHAM MITTAL	जांचकर्ता CHECKED BY R.C. AGARWAL	16.4.11 16.4.11							

सामग्री सूची संख्या INVENTORY NO P-6301	स्वतः हस्ताक्षर एवं तिथि SIGN & DATE  28/11/11	स्वतः अधिकार एवं गोपनीय दस्तावेज में दी गई सूचना भारत हेतु इलेक्ट्रिकल एंड इलेक्ट्रॉनिक्स प्रोडक्ट्स लि. के अंतर्गत है। इसका प्रयोग एवं प्रसारण के बिना लिखित अनुमति के बिना कहीं भी प्रयोग नहीं किया जा सकता है।	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.	सामग्री सूची संख्या को अतिरिक्त जस्ता SUPERSEDES INVENTORY NO	तिथि एवं तारीख SIGN & DATE
REV. NO. 02					
				उत्पाद मानक PRODUCT STANDARD	ST 47050 पृष्ठ 28 का 26 Page 26 of 28
निर्माणकर्ता WORKED BY SHUBHAM MITTAL	जांचकर्ता CHECKED BY R.C. AGARWAL			APPENDIX-4 SCHEME FOR LP BYPASS CONTROL VALVE ACTUATOR (TYPICAL)	
					

सामग्री सूची संख्या P-6301	दिनांक एवं हस्ताक्षर 28/4/11	स्वत्वधिकार 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 हितों में हानिकारक हो न किया जाए ;	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	सामग्री सूची संख्या को अतिरिक्तित करदा SUPERSEDES INVENTORY NO	दिनांक एवं हस्ताक्षर SIGN & DATE
REV. NO. 02					
					उत्पाद मानक PRODUCT STANDARD
निर्माणकर्ता WORKED BY	जांचकर्ता CHECKED BY	SHUBHAM MITTAL R.C. AGARWAL			
					ST 47050 पृष्ठ 28 का 27 Page 27 of 28
				APPENDIX-5	

SCHEME FOR LP BYPASS VALVE (SINGLE STEM) ACTUATOR (TYPICAL)



[illegible]

C&I ADDENDUM TO ST47050 REV. 01 (Tuticorin)

1. Under Clause no. 6.1.1, Position transmitter of only Balluf Make is acceptable.
2. Under Clause no. 7.1.1, Pressure switches are to be provided for changeover of Circulation Pump Units. Flow switches shall not be accepted.
3. Clause no. 7.1.1 (a) should be read as 'Three (3) no. Pressure Transmitters are to be provided in HPSU Header. Pressure Transmitters at individual discharge line of each CFP shall not be accepted'.
4. Under Clause no. 7.1.1 (g), complete instrument list shall contain the range, model no. ordering code, set point, make and process connection for all the instruments.
5. Under Clause no. 7.1.2 and 12.2.2, for Interfacing with DCS only Servo valve should be considered. Wherever in the BHEL specification Proportional valve should be read as Servo valve.
6. Under Clause no. 7.1.2, (a) ± 7.5 mA signal should not be considered as it corresponds to Proportional valve. Only ± 30 mA shall be applicable for Servo Valve.
7. Under Clause no. 7.1.2, following additional points to be noted and considered:
 - a. 20% spare Terminals in the JB are to be provided
 - b. Cable Gland to be provided in JB for DCS end also.
8. Under Clause no. 7.1.3, following additional points should be considered:
 - a. All Motors shall be of Premium efficiency class IE3, conforming to IS 12615-2011, or IEC:60034-30.
 - b. Complete Load list including power, voltage supply, rated current, starting current and RPM values is to be furnished within 4 weeks from the date of placement of P.O.
 - c. One weatherproof Junction Box (JB) with copper cable connection from JB to Motors shall be provided when motor terminal box is not adequate for terminating the aluminium power cable. Also flexible bimetallic connectors shall be used. Details of JB suitable for aluminium cables shall be provided.
 - d. Degree of protection for motors and cable box should IP-55.
 - e. Motor including fan shall be painted with corrosion proof paints of colour shade (RAL-7032).
9. Under Clause no. 11.2, List of Mandatory spares furnished by supplier shall duly mention all the KKS tags for which the corresponding item is applicable.
10. Junction Boxes for the Instruments shall be of Pyrotech, Rittal or equivalent Indian Make.
11. All KKS Tags as applicable shall be finalised during detailed engineering.
12. Under Clause no. 6.1 (a), Filter and its Differential pressure switch should be provided in each oil supply line for each servo valve.
13. Under Clause no. 7.0, Only one heater preferably 3 phase 415V (If applicable) of suitable rating should be provided.
14. Under Clause no. 7.0, for Water Cooler (if applicable), mechanical thermostatic valves should be provided for control of oil flowing through the Water cooling circuit thus altogether maintaining the uniform oil temperature in the tank. This Thermostatic valve shall operate independently and no signal exchange from BHEL DCS shall take place.
15. Level Transmitter shall be co-axial guided wave radar type.
16. Control signals for all Solenoid operated valves (trip/pilot etc.) will be 24 V DC. These solenoid will directly control/powered from BHEL DCS. All these solenoid including servo and its feedback transmitter shall be terminated in local Junction box or boxes (In vendor Scope).

No further additional power supply shall be provided by BHEL. Further vendor to note that only Junction Boxes (JBs) are to be provided by vendor with actuators. All other control elements (i.e. Cards/ Relay/contactors etc.) shall be in BHEL scope and is a part of BHEL DCS.
17. Signals from the instruments shall be processed in BHEL's system & commands from BHEL's control system shall go for controlling the motors, fans etc. in the HPSU and also the Pilot valves, Servovalves and TSVs in the valve actuators. Supplier is to furnish the recommended operation logics for the entire system enabling BHEL to develop suitable control scheme.
18. In Drg. No. 31336051501 Maximum Flow for the flow nozzle may be considered as 95.4 Kg/s instead of 95 Kg/s.

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ON SHIMWOOD

7

6

5

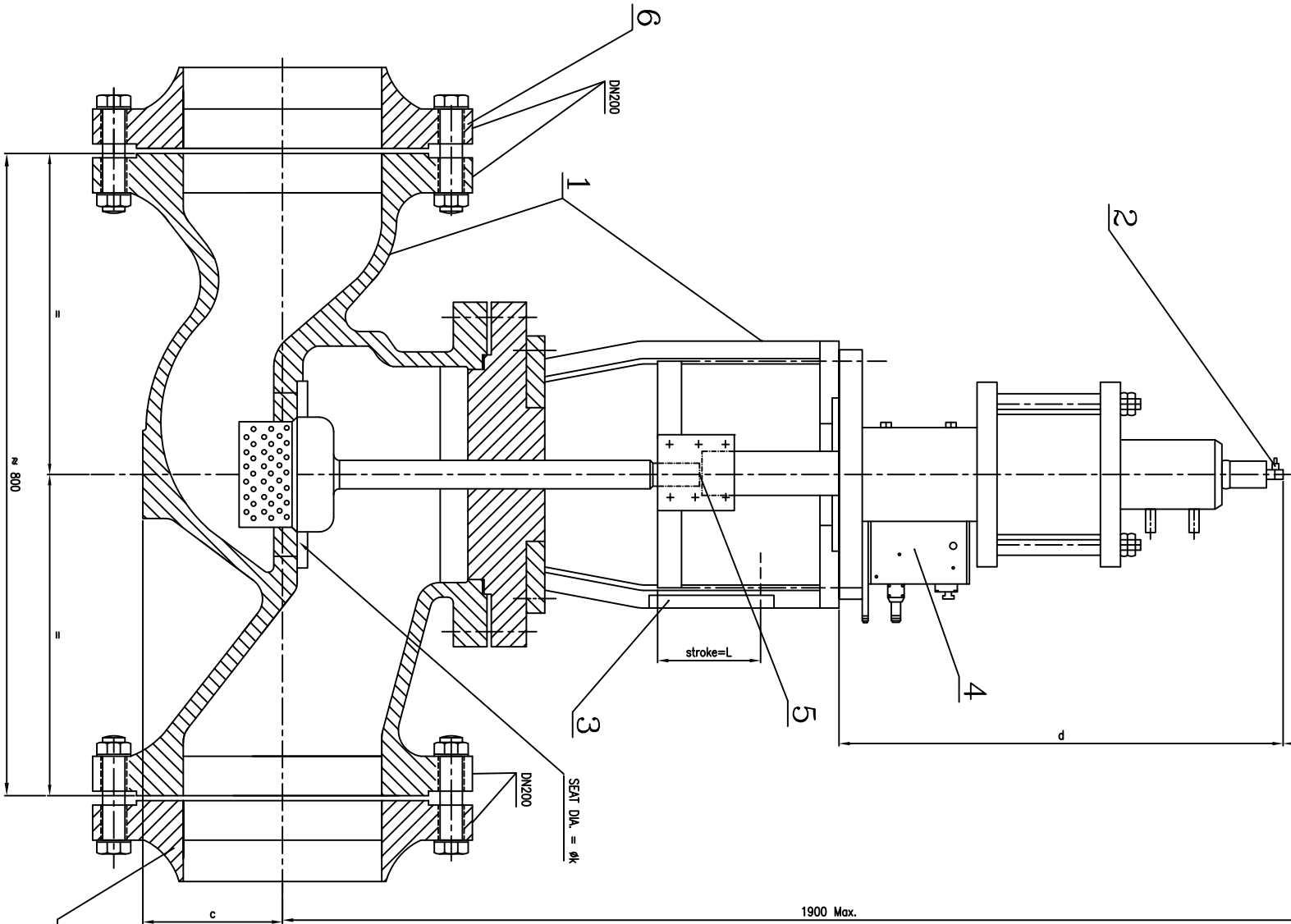
4

3

2

1

SPACE REQUIRED
FOR DISMANTLING



INPUT DATA FOR VALVE & ACTUATOR:

MAX. CALCULATED WATER MASS FLOW : 95.4 KG/SEC
MIN. CONTROLLED WATER MASS FLOW : 14.31 KG/SEC
MAX. WATER PRESSURE/TEMPERATURE : 40 BAR / 100°C
MAX. WATER PRESSURE ACROSS THE VALVE : 34 BAR
WATER PRESSURE AT VALVE INLET : 18-22.5 BAR
WATER INLET TEMPERATURE : 30 TO 60°C
NOISE REQUIREMENTS : < 85 dBA
INLET & OUTLET CONNECTIONS : SHALL BE FLANGED END (AS SHOWN)
SIZE AND MATL. OF PIPE FOR INLET/ OUTLET ENDS : Ø219.1x6.35
VALVE SIZE : ASTM A 106 Gr.B
DN 200

ACTUATOR TYPE:

OPERATING MEDIUM : ELECTRO-HYDRAULIC
CONTROL FLUID NORMAL OPERATING PRESSURE : FIRE RESISTANT FLUID (FRF)
CONTROL FLUID MINIMUM OPERATING PRESSURE: 160 BAR (*)
NORMAL CONTROL FLUID TEMPERATURE : 115 BAR (*)
MAXIMUM CONTROL FLUID TEMPERATURE : 50+5°C
CONTROL SIGNAL : 75°C
OPENING TIME : 4 TO 20mA/±30mA
ACTUATOR SPINDLE MOUNTING : <=3 SEC. (MAX.)
WATER FLOW TO BE REGULATED : VERTICAL
VALVE CHARACTERISTICS : AS PER TABLE-1
EQUAL PERCENTAGE

(*) - HYDRAULIC OPERATING PRESSURE SHALL BE MADE AVAILABLE FROM THE CENTRALISED HYDRAULIC POWER SUPPLY UNIT (HPSU). MEANT FOR TURBINE BYPASS SYSTEM.

NOTES:-

1. ACTUATOR FLANGE END CONNECTIONS:

SUPPLY LINE : Ø26.7X3.91, MATERIAL AS PER ASTM A312, GRADE TP321
RETURN LINE : Ø33.4X2.6, MATERIAL AS PER ASTM A312, GRADE TP321

2. VALVE INLET & OUTLET COUNTER FLANGE END CONNECTIONS:

Ø219.1X6.35, MATERIAL AS PER ASTM A106 GR.B

TECHNICAL REQUIREMENTS:-

- VALVE TO BE SUPPLIED ALONG WITH INLET / OUTLET COUNTER FLANGES MATERIAL (WELD NECK, RAISED TYPE).
- ASSOCIATED FASTENERS AND SEALINGS
- SCOPE OF SUPPLY SHALL BE AS PER TABLE-2
- BODY MATERIAL : GS-C25 (CAST STEEL 1.0619)/A 216 WCC/WCB
- VALVE SUPPLIER MUST SHOW THE WATER FLOW DIRECTION WITH AN ARROW EMBOSSED OVER THE VALVE BODY.
- THE ACTUATOR SHALL BE CAPABLE OF MANUAL OPERATION.
- CONTROL BLOCK/MANIFOLD SHOULD BE MOUNTED ON THE POWER CYLINDER AND IT SHOULD CONSIST OF SERVO-VALVE, FILTER, SOLENOID VALVES, CARTRIDGES/CHECK VALVES ETC.
- ELECTRONIC POSITION FEEDBACK TRANSMITTER SHALL BE NON-CONTACT TYPE REQUIRED FOR MEASURING THE POSITION OF THE CONTROL VALVE. OUTPUT OF THE POSITION TRANSMITTER SHALL BE 4mA (VALVE FULLY CLOSED) TO 20mA (VALVE FULLY OPENED).
- VALVE BODY SHALL BE HYDRAULICALLY TESTED AT MIN. 1.5 TIMES DESIGN PRESSURE AS PER DIN 3230 PT III BA/BQ/ANSI B16.34.
- STRENGTH & LEAK TIGHTNESS TEST : AS PER CLASS V ANSI B 16.104
- WATER INJECTION VALVE (W.I.V.) IS TO BE DESIGNED FOR OPERATION WITH HYDRAULIC ACTUATOR. IN FAILURE MODE THE VALVE SHALL BE IN STAYPUT CONDITION.
- VALVE CONFIGURATION SHALL BE "FLOW TO CLOSE".

DOCUMENTS REQUIRED ALONG WITH THE OFFER ARE:-

- VALVE DATA SHEET INDICATING THEREIN ALL PARAMETERS, MATERIAL DETAIL
- GENERAL ARRANGEMENT DRAWING OF VALVE WITH ACTUATOR INDICATING THEREIN MAJOR DIMENSIONS, DISMANTLING DIMENSIONS & ASSEMBLY WEIGHT.
- DRAWING FOR VALVE & ACTUATOR COUPLING ARRANGEMENT
- HYDRAULIC ACTUATOR SCHEME INDICATING THEREIN PART NUMBERS.
- OPERATION & MAINTNANCE INSTRUCTION/MANUAL.
- DATA SHEETS FOR ALL THE ITEMS MOUNTED ON THE CONTROL MANIFOLD. FURNISH THE WIRING DIAGRAM FOR ELECTRICAL ITEMS ALSO.
- LIST OF ALL RECOMMENDED SPARES FOR VALVE & ACTUATOR.
- BILL OF MATERIAL MUST BE TABULATED ON THE ASSEMBLY DRAWING.
- MATERIAL DETAIL OF THE COUNTER FLANGES TO BE FURNISHED.
- SIZING CALCULATION FOR VALVE & ACTUATOR
- QUALITY PLAN

Table-2

IT.NOS.	ITEM DESCRIPTION
1.	CONTROL VALVE WITH HYDRAULIC ACTUATOR
2.	POSITION TRANSMITTER
3.	SCALE FOR LOCALISED DISPLAY
4.	CONTROL MANIFOLD
5.	COUPLING
6.	COUNTER FLANGES WITH FASTENERS
7.	COMMISSIONING SPARES

Table-1

FLOW PARAMETERS	CHARACTERISTICS—EQUAL PERCENTAGE			
	40%	60%	80%	100%
WATER PRESSURE AT THE OUTLET OF W.I.V. (bar)	4.3	7.8	12.4	18.0
TOTAL QTY. OF WATER MASS FLOW TO BE REGULATED THRU' W.I.V. (kg/sec)	30.52	57.23	76.30	95.38

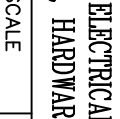
NOTE : - ALL DIMENSIONS AS MARKED SHALL BE FURNISHED BY THE SUPPLIER

REV	DATE	ALTERED	REV	DATE	ALTERED
CHECKED			CHECKED		

GRADE OF UNTOL.DIM	AGREED DEPT	NAME	SIGN	DATE
M/CG- 6 /M/ 7 AA0230208	--	---		
WELDING-A/B/C/D AA0621104	---	---		
GAS CUTTING-T3'AA0621104				

QMS-No./ CBOM No.		STATUS OF Dwg U	
APPROVED DEPT	NAME	SIGN	DATE
--	--	--	--
--	---	--	--
REV	DATE	ALTERED CHECKED	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	STEAM TURBINE
---	---------------



BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN	H.SINGH	SIGN	DATE
CHD	A.K./N.N.	--SD--	16.09.16
APPD	P.K.BANSAL	--SD--	19.09.16
NO. OF	VAR		

NO. OF	ITEMS
73	74
75	77

REV	DATE	ALTERED	REV	DATE	ALTERED
CHECKED			CHECKED		

REV	DATE	ALTERED
CHECKED		

REV	DATE	ALTERED
CHECKED		

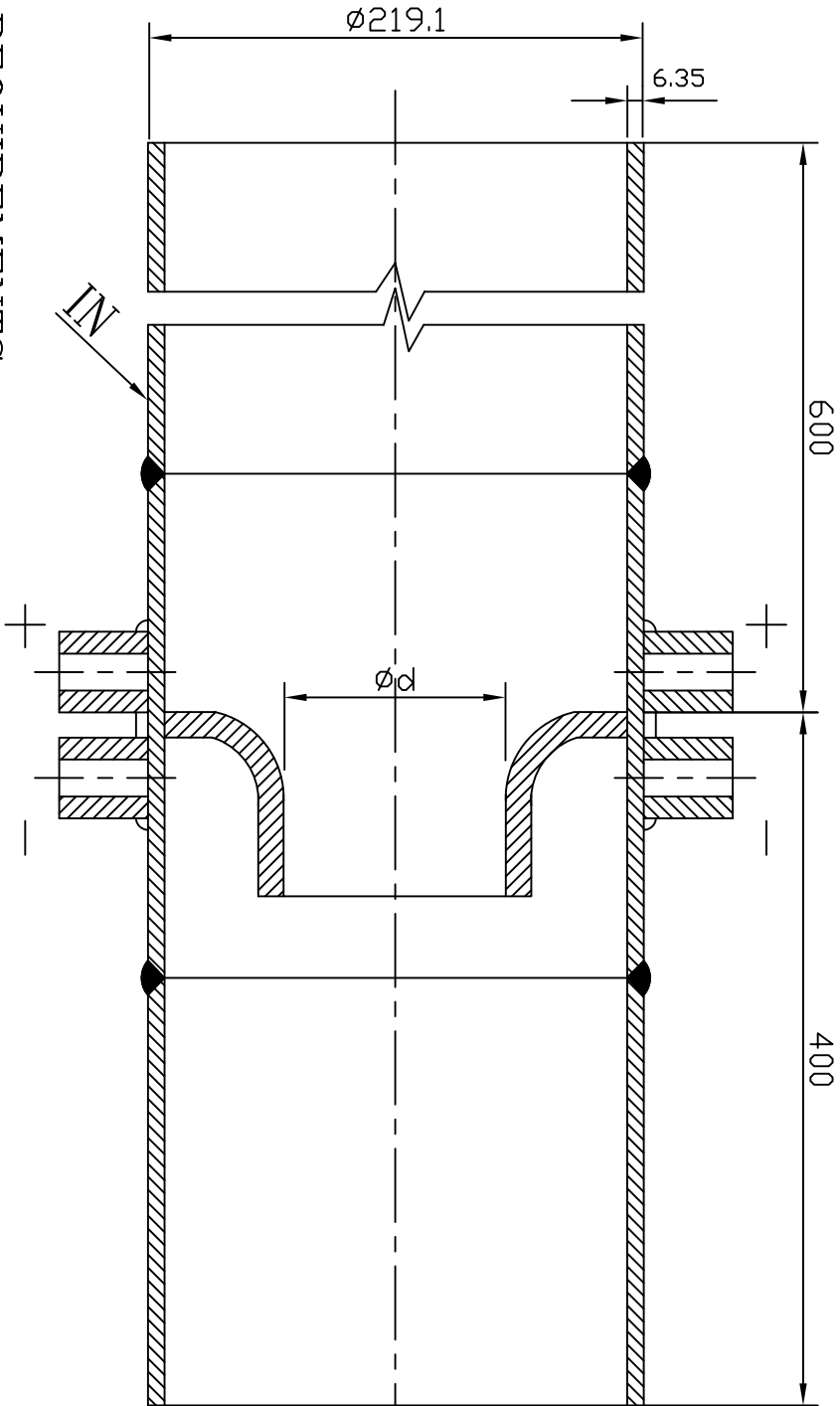
DEPT	SITE	SCALE	WEIGHT (KG)
CODE 4011	NTS	400.0	

CARD	DRAWING NO.
2-12320-28000	
7	22 23 24

SHEET No. 01	No. OF SHEETS 01
--------------	------------------

10G1509331C

आमिष्ठ संख्या / DRAWING NO.



TECH.REQUIREMENTS:-

- TYPE WELD IN TYPE WITH CORNER TAP AS PER ISA 1932.
- MATERIAL OF NOZZLE 15 MO 3
- PIPE MATERIAL ASTM A106 Gr.B
- PIPE SIZE..... Ø219.1x6.35
- MEDIUM..... CONDENSATE
- MAXIMUM FLOW 95 Kg/sec.
- OPERATING/DESIGN PRESS..... 27/40 Kg/cm2
- OPERATING/DESIGN TEMP..... 60/100C
- DIFFERENTIAL PRESSURE Approx. 1500m BAR (AT MAX. FLOW)
- TAPS 2+2 CORNER TAPS SUTABLE FOR PIPE SIZE 13.5x2.6
- TAP LENGTH 75 MM

DOCUMENTS WITH THE OFFER

1. DESIGN CALCULATIONS.
2. DRG. OF THE FLOW NOZZLE.
3. FLOW VERSUS DIFFERENTIAL OF PRESSURE CURVE.

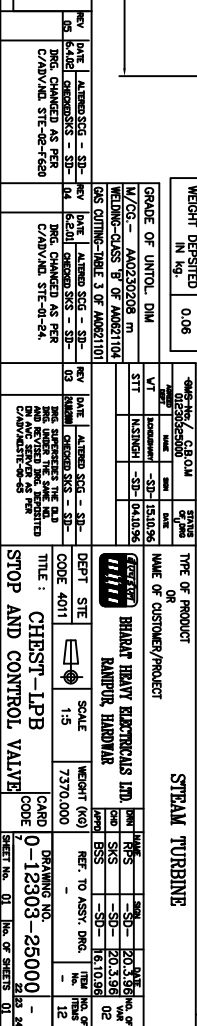
MATERIAL CODE NO. W90313360430

सामग्री सूची संख्या INVENTORY NO.	हस्ताक्षर और दिनांक/SIGN & DATE	संदर्भित अभिकल्प संख्या REFERENCE DRG. NO.
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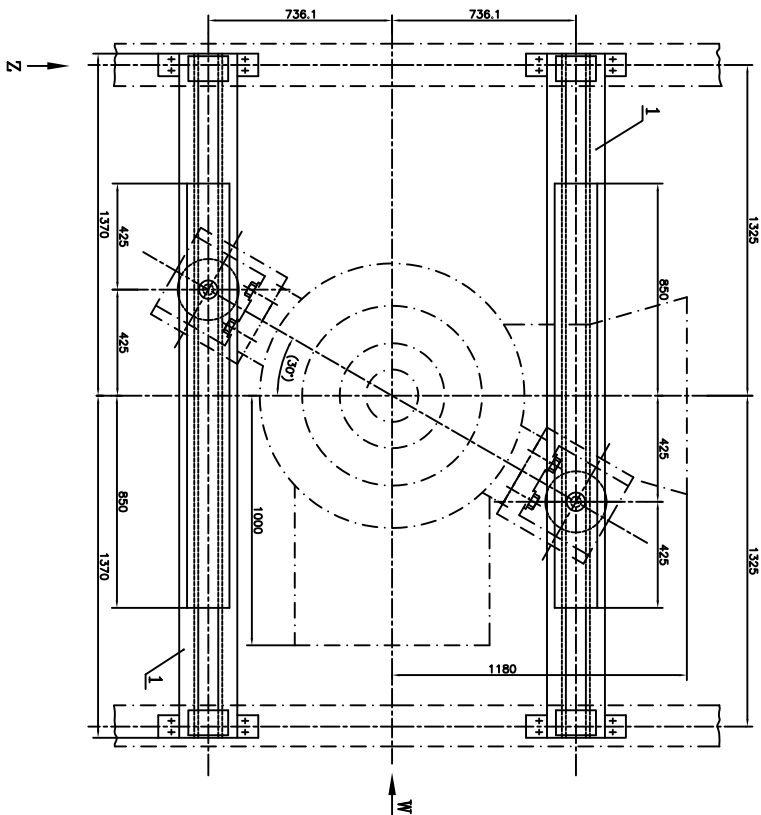
असह्य विमाओं का वर्ग GRADE OF UNTOLERANCED DIMENSION			सौ.बौ.ओ.एम./C.B.O.M. 21336051500			अधिकृत का नाम STATUS OF DRG. U		
मशीनिंग - एम0230208 एम			सहमत विभाग AGRED DEPT.			नाम/NAME SIGN.		
मशीनिंग - एम0230208 एम			MACHINING - AA0230208 m			दिनांक/DATE		
वैलिड - एम0621104 को श्रेणी बी			---			---		
वेल्डिंग-CLASS 'B' OF AA0621104			---			---		
गैस कटिंग - एम0621101 को साराणी 3			---			---		
GAS CUTTING-TABLE 3 OF AA0621101			---			---		
संशोधन REV.	दिनांक DATE	संशोधक ALTERED BY	संशोधन REV.	दिनांक DATE	संशोधक ALTERED BY	J.S.B.		
		संशोधक CHD	01	31/08/2012	संशोधक CHD	V.KUMAR		

TECH. REQ. CHANGED.
CHANGE ND. STE-12-F0348

उत्पाद का प्रकार या ग्राहक/परियोजना का नाम TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT				स्टीम टरबाइन STEAM TURBINE							
बीएचईएल Bharat Heavy Electricals Limited, Ranipur, Hardwar		भारत हेवी इलेक्ट्रिकल्स लिमिटेड, रानीपुर, हरिद्वार		निर्माणकर्ता/DRG J.S.BHANDARI		हस्ताक्षर/SIGN		दिनांक/DATE		संशोधन संख्या No. of Ver.	
विभाग DEPT.		स्टीम टरबाइन अभि.		संशोधन संख्या No. of Ver.		संशोधन संख्या No. of Ver.		संशोधन संख्या No. of Ver.		संशोधन संख्या No. of Ver.	
कूट/CODE 4011		माप/SCALE N.T.S.		भार कि. ग्रा. WEIGHT (KG)		अभिकल्प संख्या/DRAWING NO. 31336051501		अभिकल्प संख्या/DRAWING NO. 31336051501		अभिकल्प संख्या/DRAWING NO. 31336051501	
शीर्षक/TITLE		FLOW NOZZLE FOR WIV		कॉर्ड कूट CARD CODE		अभिकल्प संख्या/DRAWING NO. 31336051501		अभिकल्प संख्या/DRAWING NO. 31336051501		अभिकल्प संख्या/DRAWING NO. 31336051501	
पृष्ठ संख्या/Sheets No. 01		पृष्ठों की संख्या/No. of Sheets 01		पृष्ठों की संख्या/No. of Sheets 01		पृष्ठों की संख्या/No. of Sheets 01		पृष्ठों की संख्या/No. of Sheets 01		पृष्ठों की संख्या/No. of Sheets 01	



0-12321-02000
REF. DRAWING No.



1. LP BRASS VALVE SHALL BE WELDED WITH STEAM THROW OFF DEVICE
2. LP BRASS VALVE SHALL BE SUSPENDED IN HANGERS AND ALIGNED WITH SUPPORT AND SECURED AGAINST HORIZONTAL MOVEMENT.
3. AUSTIN ROD (ITEM 9) SO THAT BRASS VALVE IS IN THE SPECIFIED POSITION.
4. CLASSIFICATION OF WELD GROUP CK SHALL BE AS PER HH0620099.
5. WELD TEST SCOPE SHALL CONFIRM TO HH0620199 WITH CATEGORY OF SERVICE REQUIREMENT AS 4.

1. ALL WASHERS ARE BENT ON TWO SIDES OF HEXAGON.
2. SPRAY MOLYKOTE ON THREADED PARTS AND SLIDING SURFACES OF ITEM 11 & 12.

1. SUSPENSION BRACKETS AS SHOWN SHALL ALSO BE SUPPLIED ALONG WITH LPBP VALVE BY THE VALVE SUPPLIER.
2. INITIAL COMPRESSION OF SPRING HANGER = 26660N.
3. SPRING CONSTANT = 533.3N/mm.

[illegible]

SCOPE OF SUPPLY:-

S.NO.	ITEM DESCRIPTION	QTY.	UNIT
01.	STEAM BLOWING DEVICE FOR LP BYPASS VALVE	2	SET
02.	HYDRAULIC TEST DEVICE FOR LP BYPASS VALVE	2	SET
03.	ASSEMBLY AND DISASSEMBLY DEVICES	1	SET
04.	FLUSHING DEVICE FOR CONTROL FLUID SYSTEM	1	SET
05.	FILLING AND GAUGING DEVICES FOR HYDRAULIC ACCUMULATOR	1	NO
06.	MANUALLY OPERATED PUMP FOR FILLING OF CONTROL FLUID IN THE TANK OF HPSU	1	NO
07.	SPECIAL TOOLS AND TACKLES AS PER CLAUSE NO. 8.0 OF ST 47050	1	SET

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETERIMENTAL TO THE INTEREST OF THE COMPANY.

Ref.Drawing No>

-

Sign & Date

Inventory No.

GRADE OF UNTOL. DIM

M/CG.- AA0230208 m

WELDING-CLASS 'B' OF AA0621104

GAS CUTTING-TABLE 3 OF AA0621101

AGREED DEPT

NAME

SIGN

DATE

STATUS OF DRG

U

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

STEAM TURBINE

DRN

UVERMA

-SD-

26.11.14

NO. OF VAR

CHD

AKS/VM

-SD-

26.11.14

-

APPD

N. GARG

-SD-

26.11.14

73 74

DEPT

STE

CODE 4011

SCALE

NTS

WEIGHT (KG)

—

REF. TO ASSY. DRG.

—

ITEM No.

—

NO. OF ITEMS

75 77

7

3-12300-36100

22 23 24

DRAWING NO.

7

3-12300-36100

22 23 24

SHEET No.

2

No. OF SHEETS

2

TITLE : TOOL KIT FOR LP BYPASS SYSTEM

CARD CODE

REV

DATE

ALTERED

CHECKED

REV

DATE

ALTERED

CHECKED

REV

DATE

ALTERED

CHECKED

SIZE A3

SL.NO.	QUANTITY	DESCRIPTION
1.	1 SET	SET OF ALL ITEMS REQUIRED FOR ONE COMPLETE LP BYPASS STOP VALVE ASSEMBLY EXCEPT VALVE BODY
2.	1 SET	SET OF ALL ITEMS REQUIRED FOR ONE COMPLETE LP BYPASS CONTROL VALVE ASSEMBLY EXCEPT VALVE BODY
3.	1 SET	SET OF ALL ITEMS REQUIRED FOR ONE COMPLETE WATER INJECTION CONTROL VALVE ASSEMBLY EXCEPT VALVE BODY

TABLE-1 (A- SPARES OF LP BYPASS STOP VALVE, LP BYPASS CONTROL VALVE & WATER INJECTION CONTROL VALVE)

TABLE-2 (B- SPARES OF ELECTRO HYDRAULIC ACTUATOR):

S/L NO.	QUANTITY	DESCRIPTION
B.1 SPARES OF LP BYPASS STOP VALVE ACTUATOR:		
1	1 SET	COMPLETE INTERNALS EXCLUDING BODY
2.	1 NO.	EHA PILOT (OPEN/CLOSE) VALVE
3.	1 NO.	CARTRIDGE VALVE (LOGIC ELEMENT)
4.	1 NO.	EHA SOLENOID TRIP VALVE
5.	1 NO.	FILTER FOR MAIN PRESSURE LINE
6.	1 NO.	LIMIT SWITCH
7.	1 NO.	DIFFERENTIAL PRESURE SWITCH CUM INDICATOR
8.	1 NO.	DIFFERENTIAL PRESSURE INDICATOR
9.	1 NO.	LEAKAGE DETECTOR
10.	1 NO.	JUNCTION BOX
B.2 SPARES OF LP BYPASS CONTROL VALVE ACTUATOR:		
1.	1 SET	COMPLETE INTERNALS EXCLUDING BODY
2.	1 NO.	EHA SERVO VALVE
3.	1 NO.	CARTRIDGE VALVE (LOGIC ELEMENT)
4.	1 NO.	FILTER FOR MAIN PRESSURE LINE
5.	1 NO.	FILTER FOR SERVO VALVE LINE
6.	1 NO.	INTERLOCKING VALVE
7.	1 NO.	POSITION TRANSMITTER
8.	1 NO.	DIFFERENTIAL PRESSURE SWITCH CUM INDICATOR
9	1 NO.	DIFFERENTIAL PRESSURE INDICATOR

TABLE-3 (C- SPARES OF HPSU, MECHANICAL):

Sl.No.	QUANTITY	DESCRIPTION
1.	1 NO. EACH TYPE	BALL VALVE
2.	1 NO.	FLUID LEVEL INDICATOR
3.	1 NO.	AIR BREAKER
4.	1 NO.	TANK HEATER
5.	1 NO.	AXIAL PISTON PUMP (COMPLETE ASSEMBLY)
6.	1 NO.	COUPLING ASSEMBLY OF MAIN CF PUMP & MOTOR
7.	1 NO. EACH TYPE	PRESSURE RELIEF VALVE
8.	1 NO. EACH TYPE	CHECK VALVE
9.	1 NO.	HYDRAULIC ACCUMULATOR
10.	1 NO.	ACCUMULATOR SAFETY BLOCK
11.	1 NO.	PUMP FOR COOLING-CUM-FILTERATION CIRCUIT
12.	1 NO.	PUMP FOR REGENERATION CIRCUIT
13.	1 NO.	TEMPERATURE CONTROL VALVE IN COOLING CIRCUIT
14.	1 NO.	WATER COOLER (COMPLETE ASSEMBLY)
15.	1 NO. EACH TYPE	FILTER IN HPSU
16.	15 KG	CHEMICAL-MOLEKULARSIEBE
17.	12 LITER	CHEMICAL-AMBERLYST
18.	1 NO.	REGENERATION UNIT (COMPLETE ASSEMBLY)
19.	1 SET EACH TYPE	O-RINGS, GASKETS, SEALING & PACKING (EACH TYPE) IN HPSU.

TABLE-4 (D- SPARES OF HPSU, C&I):

SL.NO.	QUANTITY	DESCRIPTION
D. SPARES OF HPSU (C&I):		
1	1 NO. EACH TYPE	PRESSURE TRANSMITTER
2.	1 NO.	LEVEL TRANSMITTER
3.	1 NO.	TEMPERATURE TRANSMITTER
4.	1 NO.	TEMPERATURE SENSING ELEMENT
5.	1 NO. EACH TYPE	PRESSURE SWITCH
6.	1 NO. EACH TYPE	DIFFERENTIAL PRESSURE SWITCH
7.	1 NO.	FLOW SWITCH
8.	1 NO.	LEVEL SWITCH
9.	1 NO.	TEMPERATURE SWITCH
10.	1 NO.	LEVEL GAUGE
11.	1 NO.	TEMPERATURE GAUGE
12.	1 NO. EACH TYPE	PRESSURE GAUGE
13.	1 NO. EACH TYPE	DIFFERENTIAL PRESSURE GAUGE
14.	1 NO. EACH TYPE	CF PUMP MOTORS
15.	1 NO. EACH TYPE	JUNCTION BOX
16.	1 SET EACH TYPE	BEARINGS FOR MOTORS

B.3 SPARES OF WATER INJECTION CONTROL VALVE ACTUATOR:	
1.	1 SET COMPLETE INTERNALS EXCLUDING BODY
2.	1 NO. EHA SERVO VALVE
3.	1 NO. CARTRIDGE VALVE (LOGIC ELEMENT)
4.	1 NO. FILTER FOR MAIN PRESSURE LINE
5.	1 NO. FILTER FOR SERVO VALVE LINE
6.	1 NO. INTERLOCKING VALVE
7.	1 NO. POSITION TRANSMITTER
8.	1 NO. DIFFERENTIAL PRESSURE SWITCH CUM INDICATOR
9.	1 NO. DIFFERENTIAL PRESSURE INDICATOR
10.	1 NO. LEAKAGE DETECTOR
11.	1 NO. JUNCTION BOX

NOTES:

1. SUPPLIER TO FURNISH PRICE DATA AGAINST EACH OFFERED ITEM (AS PER TABLE-1 TO TABLE-4) FOR REFERENCE & FUTURE ORDERING.

[illegible]

LP Bypass System - Check List for Documents to be submitted along with the offer

Rev.04 Dt. 12.09.13

Sl.No	Document details	Enclosed	
<u>A. Documents related to LP Bypass Valves & Actuators:</u>			
A.1	Overall general arrangement cross-sectional assembly drawing with all major dimensions required from layout point of view. Steam Inlet & Outlet weld edge sizes, bracket for valve suspension arrangement, location of center of gravity and total assembly weight has to be specified in the drawings. Bill of material (BOM) of the valve with actuator assembly has to be tabulated. Assembly & disassembly maintenance space dimensions shall be indicated in the drawings.	YES	NO
A.2	Cross sectional actuator drawings indicating therein the flange end connection detail, total actuator weight, overall dimension & dismantling space requirement. All items should be marked and listed in the BOM on the drawing itself. On the actuator drawings, schemes for Stop & Control valve actuator shall also to be shown schematically.	YES	NO
A.3	Sizing Calculation for bypass valves & actuators.	YES	NO
A.4	Data Sheets for LP bypass valve & actuators.	YES	NO
A.5	List of special tools (if any)	YES	NO
A.6	Valve characteristics		
(a)	Lift vs. Area ; Lift vs. Flow	YES	NO
(b)	Pressure vs. flow (upstream side/ down stream side)	YES	NO
A.7	Part list of valves & actuators.	YES	NO
<u>B. Documents related to HPSU:</u>			
B.1	Schematic circuit diagram showing connection of HPSU with respective bypass actuators & sizing calculation of HPSU & its main components.	YES	NO
B.2	General arrangement drawing of HPSU indicating therein the total assembly weight, overall major layout dimensions, foundation detail, space requirement for maintenance, flanges end connection detail and their	YES	NO
B.3	Schematic diagram duly indicated with all item nos., tag Nos. and legends. In this diagram, tank capacity, pump capacity of each CF Pumps, circulation pumps, rated power consumption of each pump motor, filtration rating of each filter and capacity of each Hydraulic Accumulators has to be specified.	YES	NO
B.4	Part list duly indicated with item no/Position No., quantity, catalogued/ drg. reference no. & source of procurement etc.	YES	NO
B.5	Data Sheet of HPSU alongwith wiring diagram.	YES	NO
<u>C. Documents related to Water injection control valve</u>			
C.1	Data sheets of valve & actuator indicating therein all parameters & material details.	YES	NO

C.2	General arrangement drawing of valve with actuator indicating therein major dimensions, dismantling dimensions & assembly weight. Bill of material must be tabulated on the assembly drawing.	YES	NO
C.3	Pneumatic/ Hydraulic actuator scheme (as applicable) indicating therein part numbers.	YES	NO
C.4	Part List of valve actuator		
C.5	Drawing for valve & actuator coupling arrangement.	YES	NO
C.6	Sizing calculation for valve & actuator.	YES	NO
C.7	Curve for water mass flow vs. % lift (indicating % lift at max. design water mass flow & min. controlled water mass flow).	YES	NO
C.8	Data sheets for all the items mounted on the control manifold.	YES	NO
C.9	Wiring diagram for electrical items.	YES	NO
<u>D. Documents related to C & I</u>			
D.1	Flow Nozzle data sheet as per ISO 5167	YES	NO
D.2	Flow Nozzle drawing	YES	NO
D.3	Flow Nozzle characteristic curve between differential pressure and flow (indicating calculation formula also)	YES	NO
D.4	List of Instruments (HPSU and Actuators) duly indicated with KKS Tag Nos., type, service, set points, range & make etc.	YES	NO
D.5	Feeder load list giving details of power supply, KW rating, current drawn etc. for various motors, fans and other electrical drives (including solenoid valves)	YES	NO
D.6	Valves Actuator Schematics	YES	NO
D.7	Positioner Details	YES	NO
<u>E. Documents related to all the offered equipments:</u>			
E.1	List of commissioning spares for all the offered equipments.	YES	NO
E.2	Priced list of recommended spares for future ordering.	YES	NO
E.3	Detailed 'Quality Plan' for the offered equipments. (As per clause no. 10.0 of ST 47050).	YES	NO
E.4	List of suppliers for major castings & forgings along with their respective quality plan.	YES	NO

Sign & Date:

Name:

Designation:

Annexure-III**MASTER LIST OF DOCUMENTS (MDL) OF LP BYPASS SYSTEM (STE-TG)****Rev.04 Dt.01.05.12**

Sl. No.	Document	Remarks
<u>A. Documents to be submitted for BHEL reference prior to manufacturing:</u>		
1.	LP bypass valve sizing calculations	STE-TG
2.	Water injection valve sizing calculations	STE-TG
3.	LP bypass valve actuator selection sheet/sizing calculations	STE-TG
4.	Water injection valve actuator selection sheet/sizing calculations	STE-TG
5.	HPSU & its major component sizing calculations	STE-TG
<u>B. Documents to be submitted for BHEL approval prior to manufacturing:</u>		
1.	LPBP valve cross sectional drawing, datasheet & bill of material	STE-TG
2	WIV drawing, datasheet & bill of material	STE-TG
2	HPSU GA drawing data sheet & bill of material	STE-TG
4	HPSU schematics	STE-TG/CIE
5	I & R Diagram system	STE-TG/CIE
6	Steam blowing device & bill of material	STE-TG
7	Details of Oil/FRF flushing device	STE-TG
8	Flow nozzle datasheet as per ISO 5167	CIE
9	Flow nozzle drawing	CIE
10	Flow nozzle characteristic curve between differential pressure and flow (indicating calculation formula also)	
<u>C. Other documents to be submitted for BHEL approval :-</u>		
1.	LPBP valve actuator drawing & bill of material	STE-TG
2.	WIV actuator drawing & bill of material	STE-TG
3.	O & M manual	STE-TG
4.	Shipping/dispatch plan of the offered equipments including details of each boxes & sub boxes	STE-TG
5	List of special materials tools, equipments, facilities required for erection and commissioning.	STE-TG

Notes:

1. The vendor to submit the documents within 4 weeks from the data of placement of purchase order.
2. While submitting the documents the vendor to clearly mention the exceptions w.r.t. the documents already approved earlier by BHEL against similar projects.

ANNEXURE-IV

EQUIPMENT NAME

PROJECT NAME

VENDOR'S NAME

MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN				TO BE FILLED BY BHEL				TO BE FILLED BY BHEL			
BHEL		VENDOR'S NAME		LP BYPASS SYSTEM		ITEM	LP BYPASS SYSTEM	QP NO.	QA/BI/QP/114	REMARKS					
		DRG. NO.		AS PER PO		DATED	10/09/2014								
		SPEC.		AS PER PO											
		REV		02											
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY						
1	2	3	4	5	6	7	8	9	M	B	N	11			
Page 1 of 11															

LPBYPASS STOP& CONTROL VALVE												
1.0	RAW MATERIAL											
1.1	VALVE BODY	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		
		B. MECHANICAL PROPERTIES	MAJOR	-MECH. TEST	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		
		C. NDT	MAJOR	UT RT MPI	100% EXCEPT WELD ENDS) ON WELD ENDS 100%	AS PER APPROVED DATASHEET/ DRAWING	TC	✓	P	V		
1.2	BONNET	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		
		B. MECHANICAL PROPERTIES	MAJOR	-MECH. TEST	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		
		C. NDT	MAJOR	UT MPI	100% 100%	AS PER APPROVED DATASHEET	TC	✓	P	V		
1.3	NOZZLES	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		
		B. MECHANICAL PROPERTIES	MAJOR	-MECH. TEST	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		
		C. NDT	MAJOR	UT/MPI	100%	AS PER APPROVED DATASHEET	TC	✓	P	V		
1.4	TRANSITION PIECES	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		
		B. MECHANICAL PROPERTIES	MAJOR	-MECH. TEST	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		
		C. NDT	MAJOR	UT/MPI	100%	AS PER APPROVED DATASHEET	TC	✓	P	V		
1.5	SUSPENSION	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P	V		

FOR CUSTOMER USE	
LEGEND: I RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER	APPROVED BY <i>Sanjeev</i> 27/01/2015 संजीव कुमार भारद्वाज Sanjeev Kumar Bhardwaj अभियन्ता/Engineer गुणता आश्वासन/Quality Assurance बी. एच. ई. एल., हरिद्वार/BHEL Haridwar

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MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN				TO BE FILLED BY BHEL				TO BE FILLED BY BHEL			
BHEL		VENDOR'S NAME		ITEM	LP BYPASS SYSTEM		OP NO.	QA/B/OP/114							
				DRG. NO.	AS PER PO		DATED	10/09/2014							
				SPEC.	AS PER PO										
				REV	02										
				CHARACTERISTICS		CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY		REMARKS	
SL. NO.	COMPONENT & OPERATIONS	3	4	5	6	7	8	9	D	10	11				
1	2														

		B.MECHANICAL PROPERTIES	MAJOR	-MECH.TEST	PERHEAT	AS PERAPPROVED DATASHEET	TC	V	P	V		
		C.NDT	MAJOR	UT/MPI	100%	AS PERAPPROVED DATASHEET	TC	V	P	V		
1.6	BOLTS/NUTS	A.CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERHEAT	AS PERAPPROVED DATASHEET	TC	V	P	V		
		B.MECHANICAL PROPERTIES	MAJOR	-MECH.TEST	PERHEAT	AS PERAPPROVED DATASHEET	TC	V	P	V		
1.7	ACTUATOR	CHECKS ON ACTUATOR	MAJOR	TCREVIEW	PERPIECE	AS PERAPPROVED DATASHEET	COC	V	P	V		
2.0	MANUFACTURING											
2.1	MACHINING PARTS	VISUAL& DIMENSIONAL INSPECTION	MAJOR	VISUAL/ MEASUREMENT	PERPIECE	SHOP TRAVELER	-	V	P			
2.2	WELDING & HEAT TREATMENT	WPS	MAJOR	VISUAL TIME/TEMPERATURE	PERPIECE	EN287/ASMEIX		V	P			
2.3	ASSEMBLY	ASSY.DRWG.	MAJOR	VISUAL	PERPIECE	AS PERAPPROVED ASSY DRAWING		V	P			
3.0	TESTING & INSPECTION											
3.1	NDEWELDING	RT/UT	MAJOR	RT/UT	PERPIECE	ASMESEC.V/VIII/HW0980830	TC	V	P	W	-	IN CASE OF RT VERIFICATION OF X-RAY FILM
3.2	NDEWELDING	MT/PT	MAJOR	MT/PT	PERPIECE	ASME SEC. V/VIII/HW0980829	TC	V	P	W	-	IN CASE OF RT VERIFICATION OF X-RAY FILM
3.3	HYDROSTATIC PRESSURE TEST	ASSY.DRWG.	MAJOR	HYDRAULIC TEST	ALL VALVES	AS PERAPPROVED DATASHEET/DRAWING	TC	V	P	W	-	IBRFORM
3.4	SEAT LEAKAGE	ASSY.DRWG.	MAJOR	LEAKAGE TEST	ALL VALVES	AS PERAPPROVED DATASHEET/DRAWING	TC	V	P	W	-	

MANUFACTURER/SUB CONTRACTOR		FOR CUSTOMER USE		APPROVED BY
		LEGEND: I RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER		Sanjeev Kumar 27/01/15 संजीव कुमार भारद्वाज Sanjeev Kumar Bhargava अभियन्ता/Engineer मुमुता आशासल/Quality Assurance बी. एच. ई. एल., हरिद्वार/BHEL Haridwar

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MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN					TO BE FILLED BY BHEL				TO BE FILLED BY BHEL				
BHEL	VENDOR'S NAME			ITEM	LP BYPASS SYSTEM		QP NO.	QA/BI/QP/114									
						DATED	10/09/2014										
	DRG. NO.		AS PER PO														
	SPEC.		AS PER PO														
	REV		02		Page 3 of 11												
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK		QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS		FORMAT OF RECORDS		REMARKS				
1	2	3	4	5		6		7	8		9 D		10 11				

ITEM NO.	DESCRIPTION	WELDING+ MAIN DIMENSION	MAJOR	MEASUREMENT	ALL VALVES	AS PER DRAWING	TC	N	P	V	
3.5	DIMENSION & WALL-THICKNESS CHECK										
3.6	NDE MACHINED	PT	MAJOR	PT	ALL VALVES	ASMESEC V/VIII/HW0980829	TC	N	P	V	
3.7	FUNCTION / PERFORMANCE TEST	FUNCTIONAL TEST AS PER APPROVED TEST PROCEDURE	MAJOR	PERFORMANCE	ALL VALVES	AS PER APPROVED DATASHEET/ DRAWING	TC	N	P	W	ACTUATOR + VALVE
	NOISE LEVEL	CONFIRMATION FOR MEETING NOISE LEVEL	MAJOR	NOISE TEST					P	V	
3.8	CV TEST		MAJOR	CV TEST	PER DESIGN	AS PER APPROVED DATASHEET/ DRAWING	TC	N	P	V	
3.9	PAINTING, PACKING AND PRESERVATION		MAJOR	VISUAL	ALL VALVES	VENDOR'S STANDARD	-	N	P		

[illegible]

Sanjeev Kumar Bhardwaj
अभियन्ता/Engineer
गुणज्ञ आश्वासन/Quality Assurance
बी. एच. ई. एल., इण्डियन/ISHEL Haridwar

MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN				TO BE FILLED BY BHEL				TO BE FILLED BY BHEL				
BHEL		VENDOR'S NAME		LP BYPASS SYSTEM		QP NO.	QA/BI/QP/114	ACCEPTANCE NORMS				FORMAT OF RECORDS		AGENCY		REMARKS
		DRG. NO.		AS PER PO		DATED	10/09/2014									
		SPEC.		AS PER PO												
		REV		02												
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	7	8	9	10	11					
1	2	3	4	5	6	7	8	9	10	11						

HPSU										
1	INCOMING MATERIAL CONTROL									
1.1	OILTANK	DAMAGE	MAJOR	VISUAL	100%	MANUFACTURERDRAWING	COC	✓	P	V
		DIMENSIONS	MINOR	MEASUREMENT	100%	MANUFACTURERDRAWING	COC	✓	P	V
		VERIFICATION OF SUPPLIER CERTIFICATE, IDENTIFICATION& CORRELATION FORRAWMATERIAL PLATES	MAJOR	CERTIFICATE REVIEW	100%	MANUFACTURERDRAWING	COC	✓	P	V
1.2	BOUGHT OUT ITEMS									
	LEVEL TRANSMITTER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V
		MODEL CODE	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V
		CALIBRATION	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V
	PRESSURE TRANSMITTER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V
		MODEL CODE	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V
		CALIBRATION	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V
	TEMPERATURE TRANSMITTER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V
		MODEL CODE	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V
		CALIBRATION	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P	V

MANUFACTURER/SUB CONTRACTOR		FOR CUSTOMER USE	
LEGEND: ! RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER		APPROVED BY <i>Sanjeev</i> 27/01/15 संजीव कुमार भारद्वाज Sanjeev Kumar Bhattacharya अभियन्ता/Engineer गुणता आश्वासन/Quality Assurance बी. एच. ई. एल., इंदौर/BHEL Indore	

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	THREEPHASE MOTORS	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
		MODEL CODE	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
		VERIFICATION OF SUPPLIER CERTIFICATE	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
	ACCUMUFATOR S	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
		MODEL CODE	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
		PRESSURE TEST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
	PRESSURE RELIEF VALVES	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
		MODEL CODE	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
		ADJUSTMENT	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
	PRESSURE GUAGES	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
		MODEL CODE	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
		CALIBRATION	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
	THERMOMETER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
	CFAIR COOLER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	
	COOLING CUM FILTRATION	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	N	P	V	

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MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN				TO BE FILLED BY BHEL				TO BE FILLED BY BHEL			
BHEL		VENDOR'S NAME		ITEM	LP BYPASS SYSTEM	QP NO.	QA/B/QP/114								
				DRG. NO.	AS PER PO	DATED	10/09/2014								
				SPEC.	AS PER PO										
				REV	02										
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY			REMARKS			
1	2	3	4	5	6	7	8	9	M	B	N	10	11		

	CFPUMPS	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET		COC	N	P			
	GEARPUMPS	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET		COC	N	P			
	COUPLING	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET		COC	N	P			
	FILTERS	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET		COC	N	P			
2	FUNCTION TEST /FINAL INSPECTION												
2.1	HPSU	DIMENSIONS	MAJOR	MEASUREMENT	100%	AS PER DRAWING		TC	N	P	W		
2.2	HPSU	CORRECT FITMENT	MAJOR	VISUAL	100%	AS PER DRAWING/CIRCUIT DIAGRAM		TC	N	P	W		
2.3	HPSU	FUNCTION TEST	MAJOR	MEASUREMENT	100%	FP_0019		TC	N	P	W		
2.4	HPSU	PAINTING	MAJOR	VISUAL	100%	DRG./VENDORPROCEDURE		-	N	P			

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27/01/15 संजीव कुमार भारद्वाज Sanjeev Kumar Bhardwaj अभियन्ता/Engineer			गुणता आश्वासन/Quality Assurance बी. एच. ई. एल., हरिद्वार/BHEL Haridwar	

MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN					TO BE FILLED BY BHEL			TO BE FILLED BY BHEL			
BHEL		VENDOR'S NAME		ITEM	LP BYPASS SYSTEM		QP NO.	QA/BI/QP/114							
							DATED	10/09/2014							
				DRG. NO.	AS PER PO										
				SPEC.	AS PER PO										
		REV		02		Page 8 of 11									
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS		CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS		AGENCY		REMARKS		
1	2	3		4	5	6	7	8	9	D	M	B	N	11	
2.5	TOPASSLY	A.DEMENSION / VISUAL		MAJOR	DIMENSIONAL/ VISUAL	ALL VALVES	TOPASSLY DRWG.	-	N		P			ASSEMBLED WITH ACTUATOR	
		B.PAINT		-	VISUAL	ALL VALVES	VENDOR'S STANDARD	-	N		P				
		C.PACKING		-	VISUAL	ALL VALVES	BHEL P.O. VENDOR'S STANDARD	-	N		P				

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MANUFACTURER/SUB CONTRACTOR				

गुणता आश्वासन/Quality Assurance
बी. एच. ई. एल., हरिद्वार/BIHEL Haridwar

MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN				TO BE FILLED BY BHEL				TO BE FILLED BY BHEL			
BHEL	VENDOR'S NAME		ITEM	LP BYPASS SYSTEM		QP NO.	QA/B/OP/114								
						DATED	10/09/2014								
	DRG. NO.		AS PER PO												
	SPEC.		AS PER PO												
	REV		02												
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS		CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS		FORMAT OF RECORDS		REMARKS		
1	2	3		4	5	6		7	8		9	D	10	11	

FLOW NOZZLE FOR WIV

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