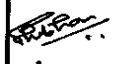
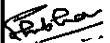


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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.		Purchase Specification For <u>Combined LP Bypass Stop & Control Valves With Electro-hydraulic Actuators (EHA)</u> & <u>Hydraulic Power Supply Unit (HPSU)</u> For <u>Steam Turbine</u>																																		
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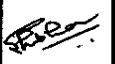
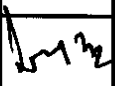
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हस्ताक्षर एवं दिनांक SIGN & DATE 28/11/11					
सामग्री सूची संख्या INVENTORY NO. P-6301	REV. NO. 02		निर्माणकर्ता WORKED BY SHUBHAM MITTAL		16.4.11
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सामग्री सूची संख्या INVENTORY NO. P-6301	REV. NO. 02				
निर्माणकर्ता WORKED BY	SHUBHAM MITTAL	16.4.11			
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सामग्री सूची संख्या को अधिकतम करता		SUPERSEDES INVENTORY NO.		II LIST OF APPENDICES TO THIS SPECIFICATION			
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 - SYSTEM		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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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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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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स्वत्वधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत भारती इलेक्ट्रिकल्स की सम्पत्ति है। इसका प्रयोग एवं प्रसारण बिना भारत भारती इलेक्ट्रिकल्स की लिखित अनुमति के बिना नहीं किया जा सकता।		Notes: i. No civil work relating to ground level is in bidder's scope. However, the foundation detail and necessary instructions, if any, in respect to locating of the centralized hydraulic supply unit from foundation point of view, has to be furnished by the bidder well in advance. This detail is required for finalization of the interface engineering activities. ii. Foundation bolts and fasteners for equipment fastening shall be in the bidder's scope. iii. Counter flanges along with fasteners & seals suiting to the end connections of actuators & HPSU shall be in bidder's scope. iv. In this bid specification, the company submitting the inquiry, namely ' BHARAT HEAVY ELECTRICALS LIMITED, HARDWAR, INDIA ' is herein after referred to as "Purchaser" or "BHEL", the manufacturer tendering the bid is referred to as "Bidder", the bidder to whom contract is awarded to as "Supplier".				
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

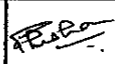
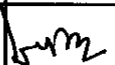
दिनांक एवं हस्ताक्षर SIGN & DATE			उत्पाद मानक PRODUCT STANDARD		ST 47050 पृष्ठ 28 का 6 Page 6 of 28	
सामग्री सूची संख्या को अतिरिक्तित्व करता	SUPERSEDES INVENTORY NO.	1.2.2 The bidder is requested to carefully examine and understand the specification prior to submitting the technical offer. Any deviation 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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स्वत्वाधिकार एवं गोपनीय इस दस्तावेज 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।						
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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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सामग्री सूची संख्या INVENTORY NO. को अधिकृतित करता	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.				
स्वतंत्रधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह 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 28/11/14	4.6 Noise Level: Maximum Noise Level: 85dB (A) at a distance of 1 meter from the body.				
सामग्री सूची संख्या INVENTORY NO. P-6301	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				
REV. NO. 02		निर्माणकर्ता WORKED BY SHUBHAM MITTAL			16.4.11
		जांचकर्ता CHECKED BY R.C. AGARWAL			16.4.11

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SUPERSEDES INVENTORY NO. समीचीन संख्या को अधिकतम करने	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.				
	4.8 Steam Blowing blanking arrangement: Steam blowing of steam inlet pipes is done before putting the valves in actual operation. Valve supplier shall also supply one no. Steam blowing blanking arrangement per LP Bypass valves per Steam Turbine unit along with the main equipment and furnish the blanking arrangement drawing for review.				
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	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.				
स्वसाधिका एवं गोपनीय इस प्रलेख में दी गई सूचना भारत की इलेक्ट्रिकल्स की संपत्ति है, प्रकाश प्रकाश एवं अन्यथा रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।	6.0 LP BYPASS STOP & CONTROL VALVE ACTUATORS:				
	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				
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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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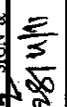
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सामग्री सूची संख्या INVENTORY NO	SUPERSEDES INVENTORY NO	6.3 Mounting Arrangement of Actuators: Type of arrangement required is specifically mentioned in the input data sheet. A typical arrangement of LP Bypass valve is shown in Appendix-1 for straight 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		
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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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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.				
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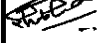
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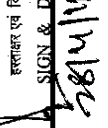
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सामग्री सूची संख्या INVENTORY NO. को अभिलिखित करना		10.0 FUNCTIONAL & TESTING REQUIREMENTS: (Refer Format-1, APPENDIX-6) Supplier shall furnish & specify the various functional & test requirements of LP Bypass valves, Actuators & HPSU in the prescribed 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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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 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		16.4.11	

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 47050	
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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. 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. 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.			
स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में कोई भी सूचना भारत डीसी इलेक्ट्रिकल्स की संपत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न	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			
समीची सूची संख्या INVENTORY NO P-6301	हस्ताक्षर एवं दिनांक SIGN & DATE 28/11/11	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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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.			
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		स्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत भारती इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रयोग एवं आश्रयक का से बिना की सह प्रयोग, जो कि भारत के हित में हानिकारक हो न किया जाए।			
दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	REV. NO. 02	निर्माणकर्ता WORKED BY	SHUBHAM MITTAL	16.4.11
दिनांक एवं हस्ताक्षर SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	REV. NO. 02	जांचकर्ता CHECKED BY	R.C. AGARWAL	16.4.11

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)			
सामग्री सूची संख्या INVENTORY NO.	REV. NO. 02	निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11
सामग्री सूची संख्या INVENTORY NO.	P-6301	जांचकर्ता CHECKED BY	R.C. AGARWAL		16.4.11

निर्माक एवं दिनांक SIGN & DATE				उत्पाद मानक PRODUCT STANDARD		ST 47050 पृष्ठ 28 का 20 Page 20 of 28	
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.					
सामग्री सूची संख्या INVENTORY NO		COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.		स्वत्वाधिकार एवं गोपनीय इस 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 सकारात्मक हो न किया जाए !		निर्माक एवं दिनांक SIGN & DATE 	
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	

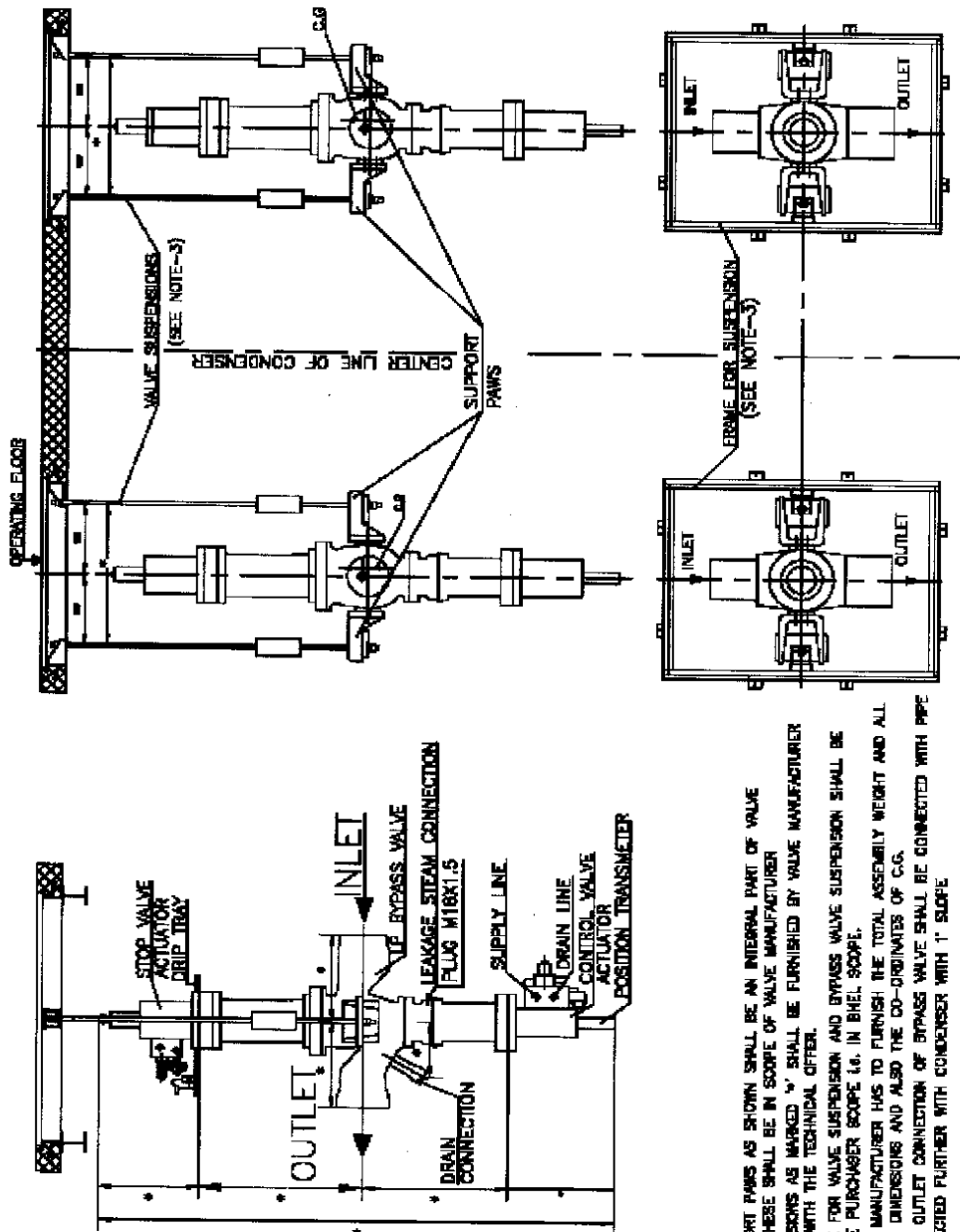
दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD		ST 47050	
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SUPERSEDES INVENTORY NO.	श्रमजी पूरवी संख्या जो अधिकतमि उत्तरा	Documents as sent along with the technical offer shall be scrutinized and finalized at BHEL end and the same shall 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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श्रमजी पूरवी संख्या INVENTORY NO.	दिनांक SIGN & DATE	16.4.11			
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 22 Page 22 of 28	
शीर्षक सूची संख्या INVENTORY NO	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.				
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स्वत्वधिकार एवं गोपनीय दृष्टांत प्रत्यक्ष में ही मंडल सुचना 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					
शीर्षक 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 शर्त किसी भी तरह प्रयोग को बिना कम्पनी के हित में अधिकारक ही 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	संशुद्धि सूची संख्या को अधिकारित व्यक्ती 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
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APPENDIX-1

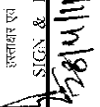
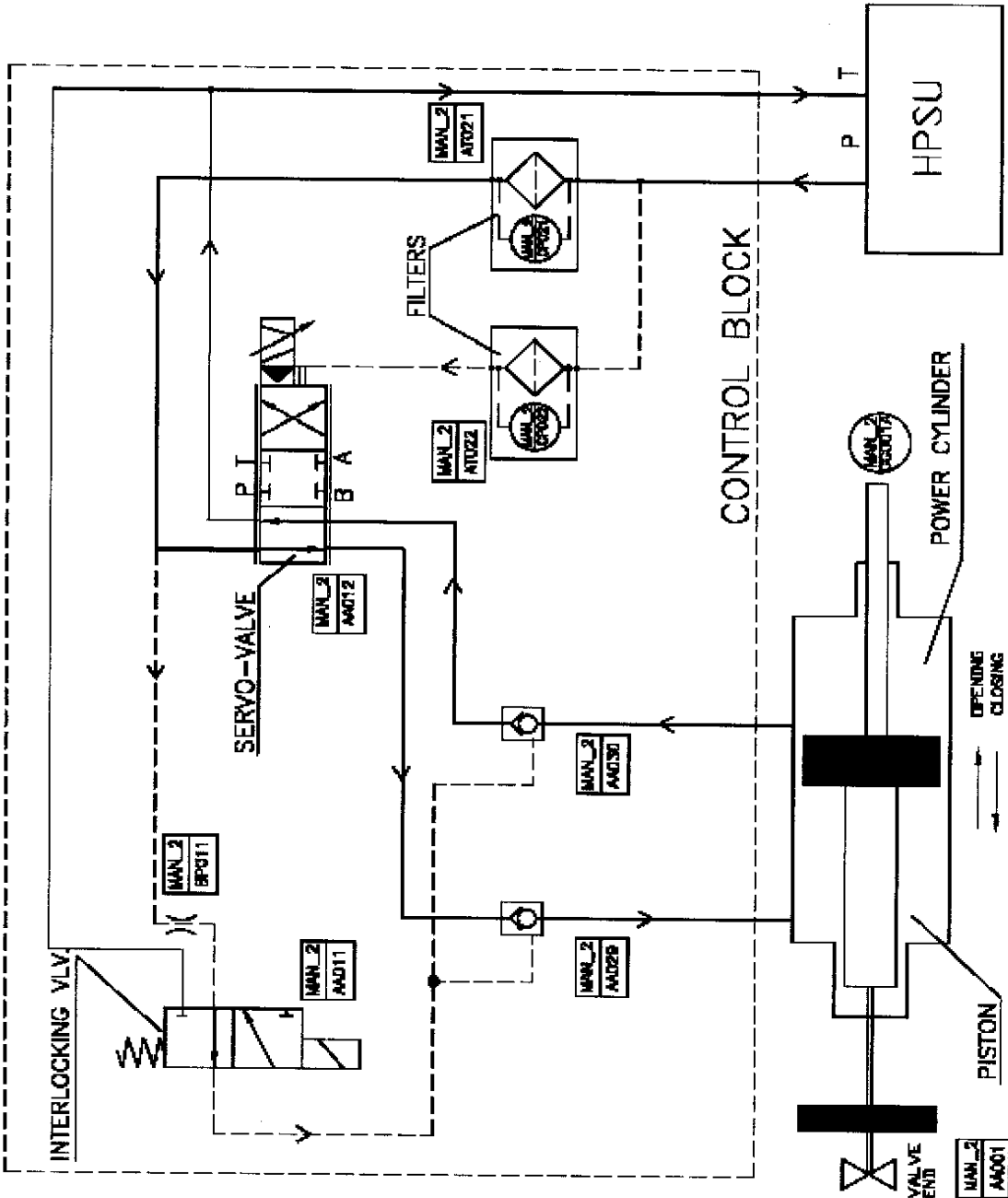
GENERAL ARRANGEMENT OF LP BYPASS VALVES (TYPICAL)



NOTE :

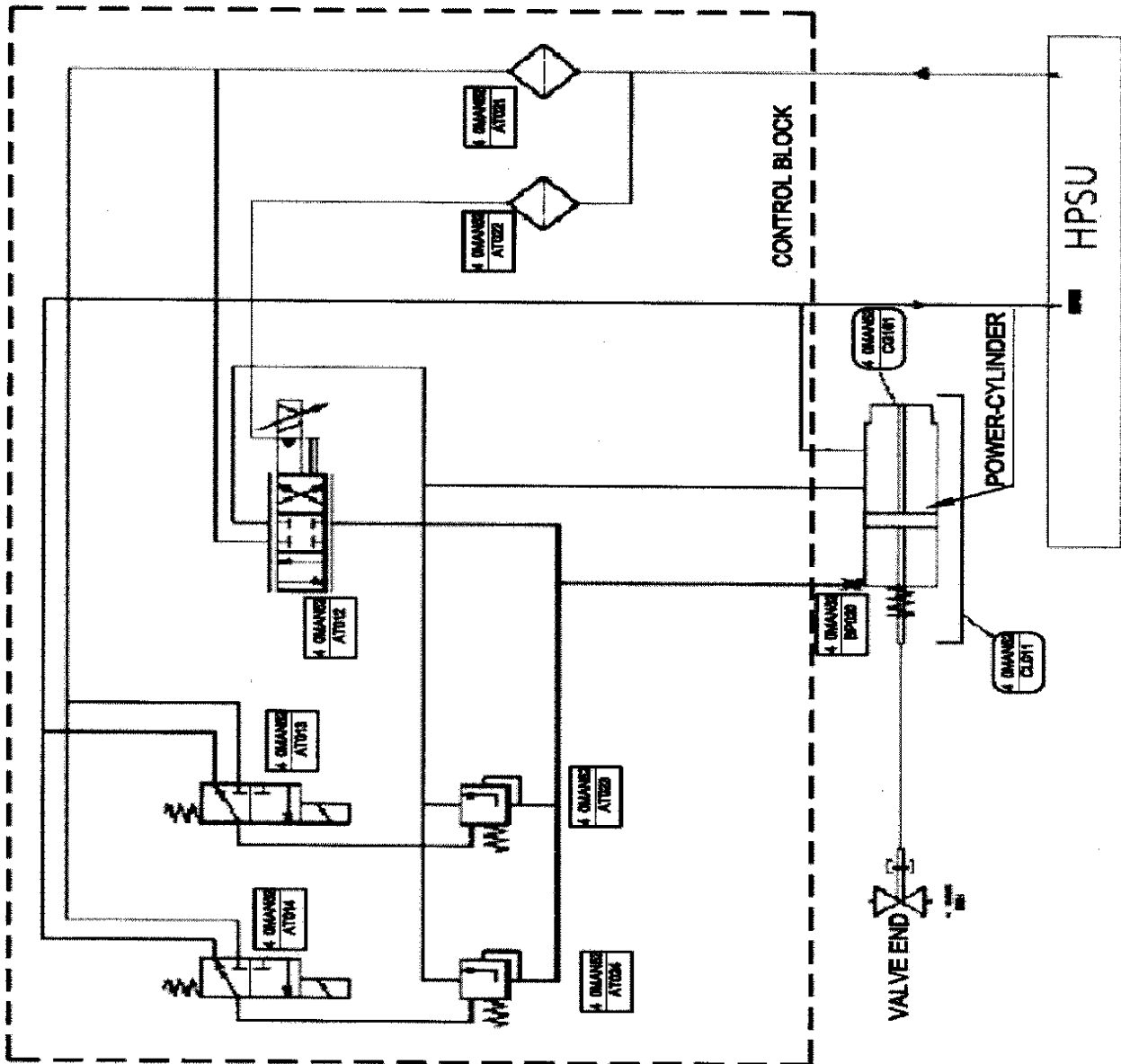
1. SUPPORT PAWS AS SHOWN SHALL BE AN INTERNAL PART OF VALVE AND THESE SHALL BE IN SCOPE OF VALVE MANUFACTURER
2. DIMENSIONS AS MARKED "X" SHALL BE FURNISHED BY VALVE MANUFACTURER ALONGWITH THE TECHNICAL OFFER.
3. FRAME FOR VALVE SUSPENSION AND BYPASS VALVE SUSPENSION SHALL BE IN THE PURCHASER SCOPE I.E. 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 प्रसारित है इसका प्रसारण एवं प्रकाशन बिना लिखित अनुमति के ग्राहक को नहीं किया जा सकता है। अन्यथा इस से कानूनी भीतर प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाय।	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 HYDRAULIC POWER SUPPLY UNIT FOR LP BYPASS SYSTEM (TYPICAL)	<table border="1"> <tr> <td>निर्माणकर्ता WORKED BY</td> <td>SHUBHAM MITTAL</td> <td></td> <td>16.4.11</td> </tr> <tr> <td>जांचकर्ता CHECKED BY</td> <td>R.C. AGARWAL</td> <td></td> <td>16.4.11</td> </tr> </table>	निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11	जांचकर्ता CHECKED BY	R.C. AGARWAL		16.4.11
निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11													
जांचकर्ता CHECKED BY	R.C. AGARWAL		16.4.11													

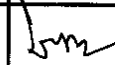
सामग्री सूची संख्या INVENTORY NO P-6301	स्वतःहस्ताक्षर एवं तिथि SIGN & DATE  28/11/11	स्वतःहस्ताक्षर एवं गोपनीय दृष्टावधान से दी गई सूचना भारत हेतु इलेक्ट्रिकल एंड इलेक्ट्रॉनिक्स प्रोपर्टी लिमिटेड के अधिकार क्षेत्र में है। अनुपयोग के लिए प्रयोग, जो कि कंपनी के हित में हानिकारक हो न सके।	COPYRIGHT AND 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	स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग जो कि कंपनी के हित में होनेवाला हो न 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)



गो सूची संख्या INVENTORY P-6301	हस्ताक्षर एवं तिथि SIGN & DATE 28/4/11	स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत ऐबी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रचलन एवं अप्रचलन केवल इसी की दृष्टि से होगा, जो कि कंपनी के हित में हानिकारक हो न किया जाए।	कॉपीराइट एंड कॉन्फिडेंशियल 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.	समाप्ति सूची संख्या को अतिरिक्त करें SUPERSEDES INVENTORY NO.	दिनांक एवं स्थान SIGN & DATE																																								
REV. NO. 02		 उत्पाद मानक PRODUCT STANDARD			ST 47050 पृष्ठ 28 का 28 Page 28 of 28																																								
APPENDIX-6, FORMAT-1																																													
<table border="1" style="width: 100%;"> <tr> <th colspan="2">FORMAT-1</th> <th colspan="2">MANUFACTURER'S NAME & ADDRESS</th> <th colspan="4">MANUFACTURING QUALITY</th> <th colspan="2">PROJECT</th> </tr> <tr> <th>SL. NO.</th> <th>COMPONENT OPERATION</th> <th>CHARACTERISTICS</th> <th>CLASS</th> <th>TYPE OF CHECK</th> <th>QUANTITY OF CHECK</th> <th>PAGE REFER. DOC.</th> <th>OF ACCEPTANCE OF NORMS</th> <th>FORMAT OF RECORDS</th> <th>AGENCY REMARKS</th> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11</td> </tr> </table>						FORMAT-1		MANUFACTURER'S NAME & ADDRESS		MANUFACTURING QUALITY				PROJECT		SL. NO.	COMPONENT OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTITY OF CHECK	PAGE REFER. DOC.	OF ACCEPTANCE OF NORMS	FORMAT OF RECORDS	AGENCY REMARKS	1	2	3	4	5	6	7	8	9	10										11
FORMAT-1		MANUFACTURER'S NAME & ADDRESS		MANUFACTURING QUALITY				PROJECT																																					
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1	2	3	4	5	6	7	8	9	10																																				
									11																																				
LEGEND: RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION * M : MANUFACTURER/SUBCONTRACTOR C : CONTRACTOR/NOMINATED INSPECTION AGENCY INDICATE 'P'-PERFORM 'W'-WITNESS & 'V'-VERIFICATION AS APPROPRIATE, 'CHP' -SHALL BE IDENTIFIED IN COLUMN-11																																													
MANUFACTURER/SUB-CONTRACTOR SIGNATURE		CONTRACTOR SIGNATURE		REVIEWED BY		FOR BHEL USE		DOC NO.																																					
								NAME & SIGN OF APPRV AUTHORITY & SEAL																																					

निर्माणकर्ता WORKED BY	SHUBHAM MITTAL		16.4.11
जांचकर्ता CHECKED BY	R.C. AGARWAL		16.4.11

C&I ADDENDUM TO ST47050 REV. 02 (North Karanpura)

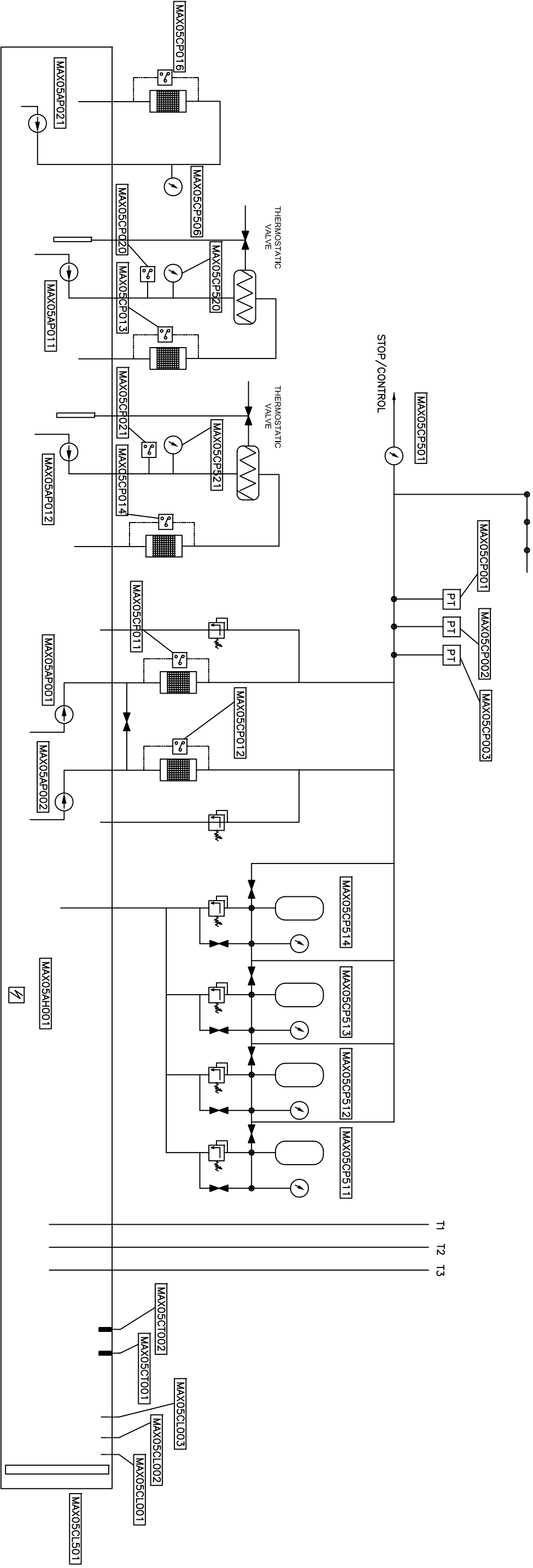
1. Under Clause no. 6.1.1, Position transmitter of only Balluf Make is acceptable.
2. Under Clause no. 7.1.1, Pressure switches are to be provided for changeover of Circulation Pump Units. Flow switches shall not be accepted.
3. Clause no. 7.1.1 (a) should be read as 'Three (3) no. Pressure Transmitters 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 +/-30mA 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, 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. Motor including fan shall be painted with corrosion proof paints as per IS-5.
 - d. Paint shade shall be as per RAL 5012 (Blue) for indoor and outdoor equipment.
9. Under Clause no. 6.1 (a),
 - Appendix 3&4 and Appendix 5 should be specially paid attention.All the instruments, equipments and their KKS tags should be as per the schemes only.

Following points should be specially noted:

 - a. Filter and its Differential pressure switch should be provided in each oil supply line for each servo valve.
10. Type Test report (As per BS-6647/IEC60770) of all Electronic Transmitters is required for Customer Approval.
11. Under Clause no. 7.0, Appendix 2 should be read in conjunction with Annexure 2. All the instruments, equipments and their KKS tags should be as per this scheme (Annexure 2) only. Following points should be specially noted:
 - a. Two separate motors for regeneration and cooling unit should be provided.
 - b. Only one heater (If applicable) of suitable rating should be provided.
12. 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.
13. 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.
14. Junction Boxes for the Instruments shall be of Pyrotech, Rittal or equivalent Indian Make.
15. Process connection for the different type of instruments shall be as follows:
 - a. Level Transmitter MAX05CL001/2/3: G ¾ Threaded
 - b. Temperature Transmitter MAX05 CT001/2: G ½
 - c. Level Gauge MAX05 CL501: M10
 - d. All Pressure Gauges : G ½
 - e. Leakage sensor MAN52/54 CL011, MAN52/55CL011: M30

- f. All Pressure Switches: G $\frac{1}{2}$
- g. All Differential Pressure Switches: G $\frac{1}{2}$
- h. All Pressure Transmitters: $\frac{1}{2}$ " NPT

ANNEXURE-2



- PENEL TRANSMITTERS : MAX05CL001/2/3
- TEMPERATURE TRANSMITTERS : MAX05CT001/2
- HEATER : MAX05AH001
- PRESSURE GUAGE : MAX05CP511/12/13/14, MAX05CP501, MAX05CP520/521,MAX05CP506
- PRESSURE SWITCH : MAX05CP020/021
- DIFFERENTIAL PRESSURE SWIT : MAX05CP011/12/13/14/16
- PUMP MOTORS : MAX05AP001/2, MAX05AP011/12, MAX05AP021

DESCRIPTION	INPUT / PROCESS DATA				
Design Pressure (bar abs.)	INLET		OUTLET		
	72.3		15		
Design Temp. (°C)	601				
Valve Diameter – DN	** – Supplier to specify				
Pressure Rating – PN	** – Supplier to specify				
Type of Valve Connections –	Butt welded				
Valve Characteristics– Linear /Quadratic /Equal %	Linear				
Valve Type – Straight / Angle	As per DRG. 3–12300–59002				
Hydraulic Medium – Mineral Oil / FRF for Actuation	Fire Resistant Fluid (FRF)				
Ambient condition	0°C to 50°C				
Material for Valve Casing	ASTM A182 Gr.F91				
OPERATING REGIMES	CASE:1	CASE:2	CASE:3	CASE:4	CASE:5
	Operating pressure at valve inlet P1 (ATA)	33.91	34.12	18.80	18.80
	Operating temp. at valve inlet T1 (°C)	593	593	450	513
	Operating pressure at inlet of dump tube near hot box wall at point 'P' shown in 3–12300–59002 P2 (bar abs.)	3*	–Supplier to specify (corresponding to Case–1)		
	Operating temperature at inlet of dump tube near hot box wall at point 'P' shown in 3–12300–59002 T2 (°C)	–Supplier to specify (Saturation Temp.)			
Steam flow per LP Bypass valve for various operating condition (T/hr)	737.95	636.78	245.38	263.97	234.63
Spray water quantity (T/hr) approx.	325.34	281.51	76.45	97.85	59.93

* ACTUAL PRESSURE VALUE SHALL BE BETWEEN 3 TO 5 BAR AND THE FINAL VALUE SHALL BE INFORMED TO SUPPLIER LATER.

CASE1 : DESIGN LOAD CASE HP-LP BYPASS/65% BMCR.
CASE2 : LOAD CASE WITH HOUSE LOAD/65% BMCR.
CASE3 : LOAD CASE WITH WARM START UP.
CASE4 : LOAD CASE WITH HOT START UP.
CASE5 : LOAD CASE WITH COLD START UP.

GRADE OF UNTOL. DIM	
M/CG.- AA0230208 m	
WELDING-CLASS 'B' OF AA0621104	
GAS CUTTING-TABLE 3 OF AA0621104	

REV	DATE	ALTERED	CHECKED
REV	DATE	ALTERED	CHECKED

Inventory No.	
Sign & Date	

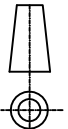
GMS No. / C B O M		STATUS OF DRG	
AGREED DEPT	NAME	SIGN	DATE

REV	DATE	ALTERED	H.SINGH	-SD-
01	12.08.16	CHECKED	AKS/NN	-SD-

CHANGES HAVE BEEN INCORPORATE AS PER CAF NO. SSTHS_000153.				
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NOTE:-

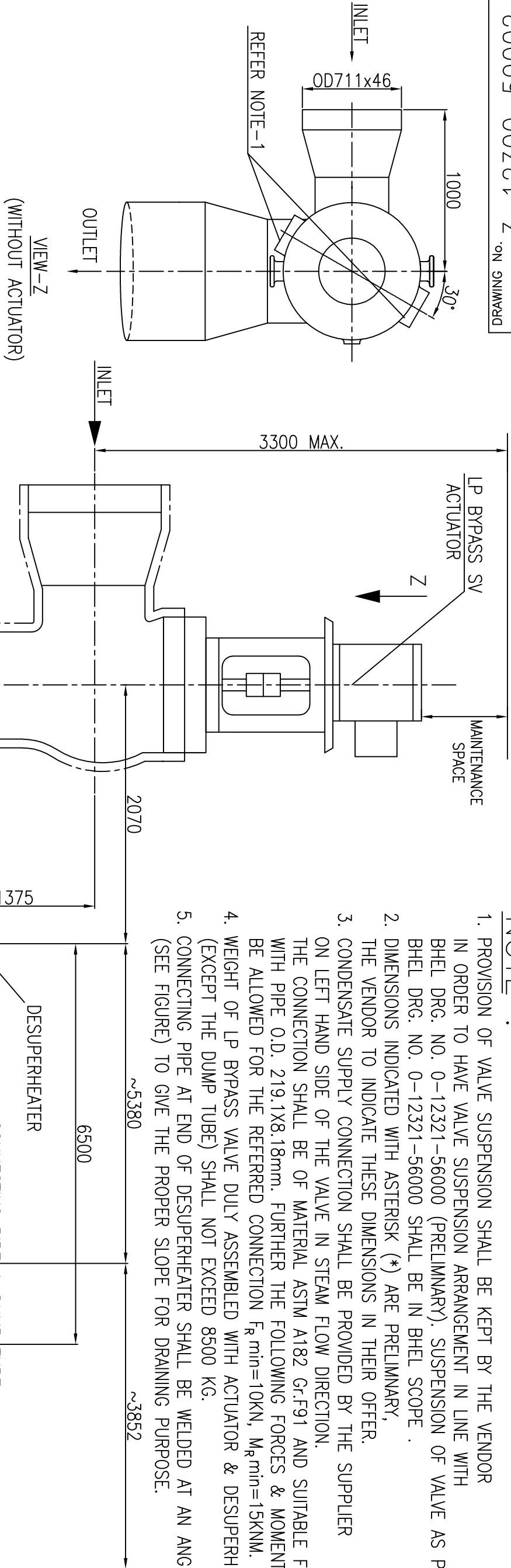
- FOR ANGLE TYPE OF LP BYPASS VALVE
– STOP VALVE ACTUATOR SHALL BE : VERTICAL (STANDING)
– CONTROL VALVE ACTUATOR SHALL BE : HORIZONTAL
- ALL COMPONENTS OF LPBP STOP & CONTROL VALVE SHALL BE DESIGNED FOR DESIGN PRESSURE AND TEMPERATURE CONDITIONS & CORRESPONDING STEAM FLOW (i.e. 72.3 BAR & 601°C).
- THE LPBP VALVE SHALL ALSO BE SUITABLE FOR MAX. SHORT TERM PRESSURE 78 bar (a) & MAX. SHORT TERM TEMPERATURE OF 617°C. MAX. SHORT TERM PRESSURE AND TEMPERATURE ARE ONLY ALLOWED FOR BRIEF SWINGS OF 15 MINUTES OR LESS, PROVIDED THAT THE TOTAL OPERATING TIME DOES NOT EXCEED 80 HOURS DURING ANY 12 MONTHS OPERATING PERIOD.
- THE EXHAUST STEAM AFTER LP BYPASS VALVE WITH DESUPERHEATER SHALL GO TO AIR COOLED CONDENSER THROUGH HOT BOX.
- LPBP VALVE WITH DESUPERHEATER SHALL BE DESIGNED FOR THE FOLLOWING CONDITIONS:
 - HOT BOX INLET PARAMETERS DURING LPBP OPERATION (PRESSURE 0.312 BAR ABSOLUTE & STEAM TEMPERATURE 72.9°C).
 - HOT BOX MAXIMUM ALLOWABLE PARAMETERS (PRESSURE 0.5 BAR ABSOLUTE & STEAM TEMPERATURE 90°C).
 - WATER QUANTITY TO BE SPRAYED THROUGH DESUPERHEATER TO OBTAIN ENTHALPY OF EXHAUST STEAM MIXTURE AS 2630 KJ/Kg.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		STEAM TURBINE				
 BHARAT HEAVY ELECTRICALS LTD. RANIPUR, HARDWAR		DRN	H.SINGH	-SD-	23.07.15	NO. OF
		CHD	N.NIRALA	-SD-	24.07.15	VAR
		APPD	N.GARG	-SD-	24.07.15	73 74
DEPT	STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011		NTS	-----	---	---	75 77
TITLE : INPUT/PROCESS DATA FOR LPBP VALVE AND ACTUATORS			CARD CODE	DRAWING NO. 3-12300-59001		
				SHEET No. 1	No. OF SHEETS 1	

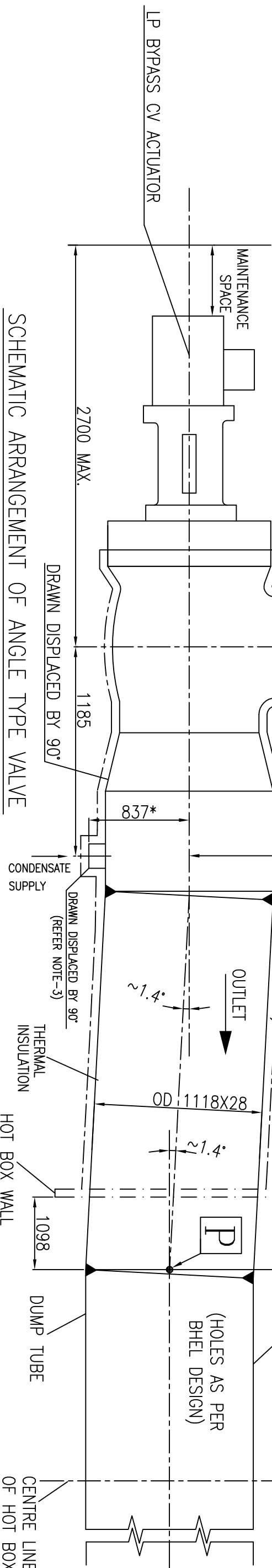
20065-0021-2
No. GINWARD

NOTE :-

1. PROVISION OF VALVE SUSPENSION SHALL BE KEPT BY THE VENDOR IN ORDER TO HAVE VALVE SUSPENSION ARRANGEMENT IN LINE WITH BHEL DRG. NO. 0-12321-56000 (PRELIMINARY). SUSPENSION OF VALVE AS PER BHEL DRG. NO. 0-12321-56000 SHALL BE IN BHEL SCOPE .
2. DIMENSIONS INDICATED WITH ASTERISK (*) ARE PRELIMINARY, THE VENDOR TO INDICATE THESE DIMENSIONS IN THEIR OFFER.
3. CONDENSATE SUPPLY CONNECTION SHALL BE PROVIDED BY THE SUPPLIER ON LEFT HAND SIDE OF THE VALVE IN STEAM FLOW DIRECTION.
4. WEIGHT OF LP BYPASS VALVE DULY ASSEMBLED WITH ACTUATOR & DESUPERHEATER (EXCEPT THE DUMP TUBE) SHALL NOT EXCEED 8500 KG.
5. CONNECTING PIPE AT END OF DESUPERHEATER SHALL BE WELDED AT AN ANGLE OF 1.4° (SEE FIGURE) TO GIVE THE PROPER SLOPE FOR DRAINING PURPOSE.



SCHEMATIC ARRANGEMENT OF ANGLE TYPE VALVE



3-12300-56002
Ref.Drawing No>

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Inventory No. Sign & Date

REV	DATE	ALTERED	CHECKED

GRADE OF UNTOL. DIM
M/CG.- AA0230208 m
WELDING-CLASS 'B' OF AA0621104
GAS CUTTING-TABLE 3 OF AA0621104

REV.	DATE	ALTERED	CHECKED

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—GMS No. /	C	B	O	M	STATUS of DRG
AGREED DEPT	NAME	SIGN	DATE		

HXE	A.GUPTA	-SD-	21.07.15
PED	A.KUMAR	-SD-	21.07.15

REV	DATE	ALTERED	H.SINGH
01	12.08.16	CHECKED	AKS/NN

CHANGES HAVE BEEN INCORPORATE AS PER C/R NO. SSTHS_000152.

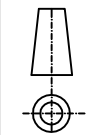
TYPE OF PRODUCT OR
NAME OF CUSTOMER/PROJECT

STEAM TURBINE



BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DEPT STE
CODE 4011



SCALE
NTS

WEIGHT (KG)

REF. TO ASSY. DRG.

ITEM NO. 75 77

TITLE :
ARRANGEMENT OF LPBP VALVE
ALONGWITH ASSOCIATED EQUIPMENT

CARD CODE

DRAWING NO.
3-12300-59002

SHEET No. 1 No. OF SHEETS 1

20065-0021-2

ON DRAWING

7

6

5

4

3

2

1

INPUT DATA FOR VALVE & ACTUATOR:

MAX. DESIGN WATER MASS FLOW	: 360 T/h
MAX. CALCULATED WATER MASS FLOW	: 325.34 T/h
MIN. CONTROLLED WATER MASS FLOW	: 32.5 T/h
MAX. WATER PRESSURE/TEMPERATURE	: 49 BAR / 100°C
MAX. WATER PRESSURE ACROSS THE VALVE	: 40 BAR
WATER PRESSURE AT VALVE INLET	: 25.35 BAR
WATER INLET TEMPERATURE	: 30 TO 70°C
NOISE REQUIREMENTS	: < 85 dB(A)
INLET & OUTLET CONNECTIONS	: SHALL BE FLANGED END (AS SHOWN)
VALVE SIZE	: 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	: ±30ms
ACTUATOR SPINDLE MOUNTING	: <=3 SEC. (MAX.)
WATER FLOW TO BE REGULATED	: VERTICAL
VALVE CHARACTERISTICS	: AS PER TABLE-1
FAILURE MODE	: EQUAL PERCENTAGE
SUPPLY LINE	: STAY PUT
RETURN LINE	: 48.3X5.08
	: 48.3X3.68

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

NOTES:-

1. VALVE INLET & OUTLET COUNTER FLANGE END CONNECTIONS: $\phi 219.1 \times 6.35$, MATERIAL AS PER ASTM A216 GR:B
2. PRESSURE DROP IN PIPE LINE FROM OUTLET OF WIV TO INLET OF DESUPERHEATER SHALL BE 0.5 BAR.

Table-1 (TO BE FURNISHED BY SUPPLIER)

FLOW PARAMETERS	CHARACTERISTICS-EQUAL PERCENTAGE				
	CASE-1	CASE-2	CASE-3	CASE-4	CASE-5
WATER PRESSURE AT THE OUTLET OF W.I.V. (bar)	(TO BE FURNISHED BY SUPPLIER)				
TOTAL QTY. OF WATER MASS FLOW TO BE REGULATED THRU' W.I.V. (Kg/Sec)	(TO BE FURNISHED BY SUPPLIER)				

Table-2

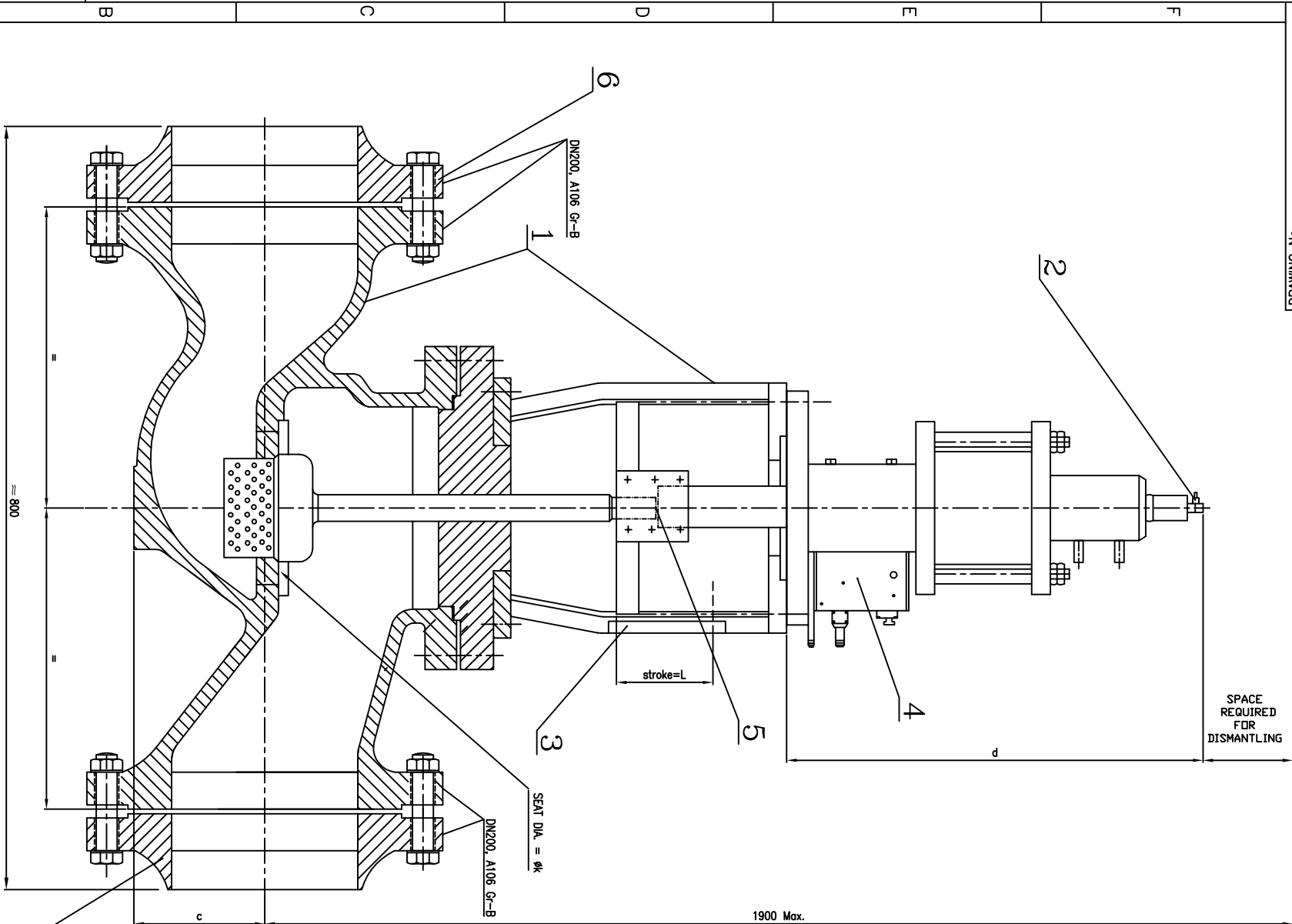
ITM.NOS.	ITEM DESCRIPTION
1.	CONTROL VALVE WITH HYDRAULIC ACTUATOR
2.	POSITION TRANSMITTER
3.	SCALE FOR LOCALISED DISPLAY
4.	CONTROL MANIFOLD
5.	COUPLING
6.	COUNTER FLANGES WITH FASTENERS
7.	COMMISSIONING SPARES AS PER BHEL DRAWING NO. 3-12300-56005

TECHNICAL REQUIREMENTS:-

1. VALVE TO BE SUPPLIED ALONG WITH INLET / OUTLET COUNTER FLANGES (WELD NECK, RAISED TYPE), ASSOCIATED FASTENERS AND SEALINGS.
2. SCOPE OF SUPPLY SHALL BE AS PER TABLE-2.
3. BODY MATERIAL : CAST STEEL GS-C25 (1.0619) / A216 WCC.
4. VALVE SUPPLIER MUST SHOW THE WATER FLOW DIRECTION WITH AN ARROW EMBOSSED OVER THE VALVE BODY.
5. THE ACTUATOR SHALL BE CAPABLE OF MANUAL OPERATION & FURNISH RELEVANT TECHNICAL DETAILS ALONGWITH OFFER.
6. CONTROL BLOCK/MANIFOLD SHOULD BE SERVO-VALVE, FILTER, SOLENOID CYLINDER AND IT SHOULD CONSIST OF SERVO-VALVE, FILTER, SOLENOID VALVES, CARTRIDGES/CHECK VALVES ETC.
7. 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).
8. STRENGTH & LEAK TIGHTNESS TEST : AS PER CLASS V ANSI B 16.104
9. VALVE BODY SHALL BE HYDRAULICALLY TESTED AT MIN. 1.5 TIMES DESIGN PRESSURE AS PER DIN 3230 PT III BA/BQ/ANSI B16.34.
10. 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.
11. VALVE CONFIGURATION SHALL BE "FLOW TO CLOSE".

DOCUMENTS REQUIRED ALONG WITH THE OFFER ARE:-

1. DOCUMENTS REQUIRED ALONG WITH THE OFFER SHALL BE AS PER CL. 12.2.3 OF ST47050.
2. IN ADDITION TO CL.12.2.3 OF ST47050 FOLLOWING DOCUMENTS ARE REQUIRED TO BE SUBMITTED ALONG WITH THE OFFER-
 - 2.1. LIST OF ALL RECOMMENDED SPARES FOR VALVE & ACTUATOR AS PER BHEL DRAWING NO. 1-12300-56006.
 - 2.2. MATERIAL DETAIL OF THE COUNTER FLANGES TO BE FURNISHED.
 - 2.3. QUALITY PLAN.



NOTE : - ALL DIMENSIONS AS MARKED (ØK, L, c, d) 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.-C/M/F AA0230208		CIE	S.K.DAS	-SD-	23.07.15
WELDING-A/B/C/D AA0621104					
GAS CUTTING-T3,AA0621101					
REV	DATE	ALTERED	H.SINGH	-SD-	
01	01.08.16	CHECKED	AKS/NN	-SD-	

QMS-No- / CBOM No. STATUS OF DRG

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

STEAM TURBINE



BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN	H.SINGH	SIGN	DATE
CHD	N.NIRALA	-SD-	21.07.15
APPD	N.GARG	-SD-	24.07.15

DEPT	SITE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO. OF ITEMS
CODE 4011		NTS	5600.0	-	75 - 77

TITLE : WATER INJECTION CONTROL VALVE	CARD CODE 2-12300-59003	DRAWING NO. 2-12300-59003	SHEET No. 01	No. OF SHEETS 01
--	----------------------------	------------------------------	--------------	------------------

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COPYRIGHT AND CONFIDENTIAL

2-12300-56003
Ref.Drawing No>

Sign & Date

Inventory No

00165-00021-02

No. GINWARD

LIST OF MANDATORY SPARES AS PER CLAUSE NO.1.1.2 OF ST47050:-

TABLE-1 MECHANICAL SPARES

SL.NO.	CLAUSE	DESCRIPTION	QTY.	UNIT
01	B/1/17	LP BYPASS CONTROL VALVE (SET OF INTERNALS REQUIRED TO FORM ONE VALVE ASSEMBLY EXCEPT VALVE BODY)	1	NO.
02	B/1/18	SERVOVALVE/PROPORTIONAL VALVE FOR LP BYPASS CONTROL VALVE (SET OF ALL INTERNALS REQUIRED TO COMPLETE ONE VALVE ASSEMBLY EXCEPT VALVE BODY)	1	SET
03	B/1/19	LP BYPASS STOP VALVE (SET OF INTERNALS REQUIRED TO FORM ONE VALVE ASSEMBLY EXCEPT VALVE BODY)	1	SET
04	B/1/20	WATER INJECTION VALVE COMPLETE ASSEMBLY FOR LP BYPASS SYSTEM WITHOUT ACTUATOR	1	NO.
05	C/1/XIII	SERVO VALVE/PROPORTIONAL VALVE FOR SPRAY WATER INJECTION VALVE FOR LP BYPASS SYSTEM (COMPLETE SET)	1	NO.
06	C.I.XIX/2	DUPLEX OIL FILTER FOR HPSU OF LPBP SYSTEM	2	SET
07	CIE.C.6.D/3	TRIP SOLENOID VALVE FOR EHA OF LPBP CONTROL VALVE	2	NOS.
08	CIE.C.6.D/4	TRIP SOLENOID VALVE FOR EHA OF WATER INJECTION VALVE FOR LPBP	2	NOS.
09	CIE.B.1.2	SERVO VALVE FOR LPBP CONTROL VALVE	1	SET
10	CIE C.6.E	HIGH PRESSURE HOSES FOR LPBP VALVE	2	SET

TABLE-2 C&I SPARES

SL.NO.	CLAUSE	DESCRIPTION	QUANTITY	UNIT
01	21.4(G)	LP BYPASS CONTROL FLUID PUMP MOTOR	1	NO.
02	21.4(H)	LP BYPASS CONTROL FLUID RECIRCULATION PUMP MOTOR	1	NO.
03	CIE.B.V.2.IV & 7.I	POSITION TRANSMITTER FOR LPBP CVs	3	NOS.
04	CIE.B.V.2.IV & 7.II	POSITION TRANSMITTER FOR WV CVs	3	NOS.
05	CIE.B.V.2.IV	PRESSURE TRANSMITTER FOR HPSU LPBP SYSTEM	1	NO.
06	CIE.B.V.2.IV	LEVEL TRANSMITTER FOR HPSU LPBP SYSTEM	1	NO.
07	CIE.B.V.2.IV	TEMPERATURE TRANSMITTER FOR HPSU LPBP SYSTEM	1	NO.

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Ref.Drawing No>-----

Sign & Date

Inventory No.

-----GMS No. / C B O M STATUS OF DRG

AGREED DEPT NAME SIGN DATE

CIE HIMADRI -sd- 20.04.15

GRADE OF UNTOL. DIM

M/CG.- AA0230208 m

WELDING-CLASS 'B' OF AA0621104

GAS CUTTING-TABLE 3 OF AA0621104

REV	DATE	ALTERED	REV	DATE	ALTERED
	CHECKED			CHECKED	

REV	DATE	ALTERED	H.SINGH	-SD-
01	28.07.16	CHECKED	A.K./N.N.	-SD-

CHANGES HAVE BEEN INCORPORATED AS PER C/A NO. STE-16-F0230.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

भारत हेवी इलेक्ट्रिकल्स लि.

BHARAT HEAVY ELECTRICALS LTD.

रानिपुर, हार्दवार

RANIPUR, HARDWAR

DRN

H.SINGH

-SD-

20.04.15

NO. OF

VAR

CHD

H.G./N.N.

-SD-

20.04.15

-

APPD

N.GARG

-SD-

22.04.15

73

74

DEPT

STE

SCALE

WEIGHT (KG)

REF. TO ASSY. DRG.

ITEM NO.

NO. OF ITEMS

CODE

4011

NTS

75

77

TITLE :

MANDATORY SPARES FOR LPBP(EHA)-NORTH KARANPURA

CARD CODE

DRAWING NO.

3-12300-59100

SHEET No.

1

No. OF SHEETS

1

TECHNICAL REQUIREMENTS:-

1. ALL THE MANDATORY SPARES SHALL BE MANUFACTURED & SUPPLIED ALONGWITH THE MAIN EQUIPMENT.

2. INTERCHANGEABILITY OF ALL THE SPARES WITH THE RESPECTIVE ORIGINAL PARTS FOR WHICH THEY ARE INTENDED FOR REPLACEMENTS HAS TO BE ENSURED BY THE SUPPLIER.

3. ALL THE SPARES MUST BE PACKED IN SEALED TRANSPARENT PLASTIC BAGS AND CLEARLY MARKED OR LABELLED OUTSIDE THE PACKING WITH THEIR DESCRIPTION & ASSEMBLY PART NUMBERS.

4. QUALITY CHECKS & TESTING NORMS/REQUIREMENTS AS PER AGREED QUALITY PLAN (QP) SHALL ALSO BE APPLICABLE FOR ALL THE SPARES AS LISTED IN THIS DRAWING.

5. ALL THE RELEVENT ASSEMBLY DRGS. SHALL BE FURNISHED BY THE VENDOR MARKING ALL THE OFFERED ITEMS.

6. OFFERED ITEMS SHALL BE CORRELATED WITH THE ITEMS MENTIONED IN THIS DRAWING & WITH RESPECTIVE BOM OF MAIN EQUIPMENT DRAWING.

MAT. CODE : W99312300946

STEAM TURBINE

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):

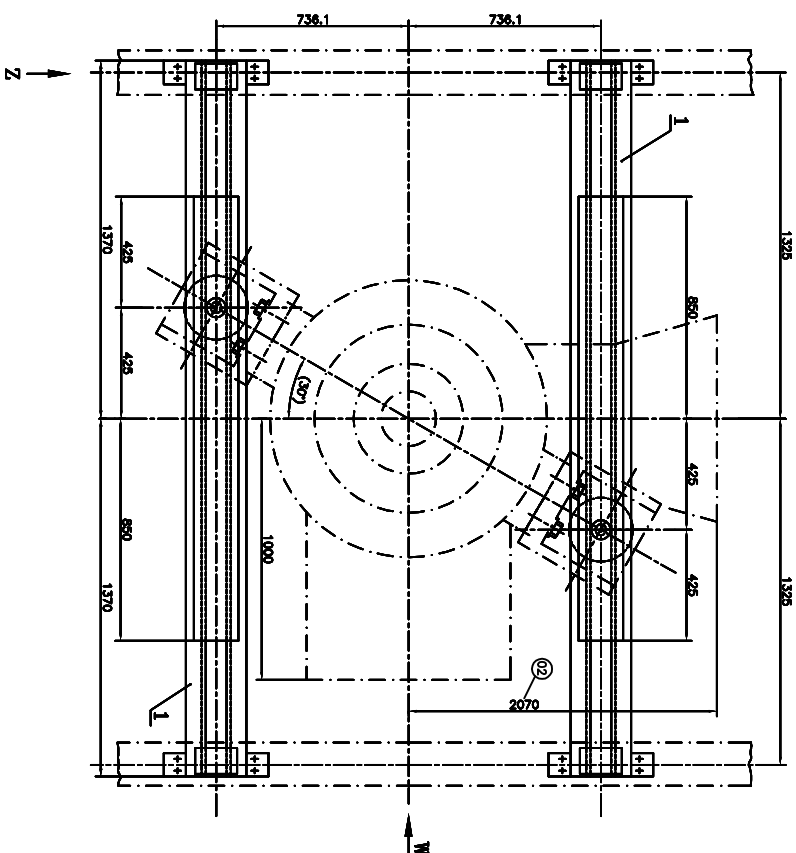
SL.NO.	QUANTITY	DESCRIPTION
D. SPARES OF HPSU (C&I):		
1	1 NO. EACH TYPE	PRESSURE TRANSMITTER
2.	1 NO.	LEVEL TRANSMITTER
3.	1 NO.	TEMPERATURE TRANSMITTER
4.	1 NO.	TEMPERATURE SENSING ELEMENT
5.	1 NO. EACH TYPE	PRESSURE SWITCH
6.	1 NO. EACH TYPE	DIFFERENTIAL PRESSURE SWITCH
7.	1 NO.	FLOW SWITCH
8.	1 NO.	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]



TECHNICAL REQUIREMENTS

1. LP BRASS VALVE SHALL BE WELDED WITH CONNECTING PIPE.
 2. LP BRASS VALVE SHALL BE SUSTAINED IN HANGERS AND ALIGNED WITH SUPPORT AND SECURED AGAINST HORIZONTAL MOVEMENT.
 3. ADJUST ROD (ITEM 9) SO THAT BRASS VALVE IS IN THE SPECIFIED POSITION.
 4. CLASSIFICATION OF WELD GROUP OR SHALL BE AS PER HNB020089.
 5. WELD TEST SCOPE SHALL COMPLY TO HNB050109 WITH CATEGORY OF SERVICE REQUIREMENT AS 4.
- ### **TECHNICAL REQUIREMENTS**
1. ALL WISHERS ARE BENT ON TWO SIDES OF HEXAGON.
 2. SPACING SHALL VARY ON THEMEDD PARTS AND SLOPING SURFACES
 3. 9) FOR BENT 60° IN PROJECT, L=3770mm.
 3. 9) FOR BENT 60° IN PROJECT, L=3740mm.
 3. 9) FOR LAMPPAR 650 MM AND OTHER PROJECTS, L=3740mm.
- NOTE:-**
1. SUSPENSION BRACKETS AS SHOWN SHALL ALSO BE SUPPLIED ALONGSIDE WITH LPPR VALVE BY THE VALVE SUPPLIER.
 2. INITIAL COMPRESSION OF SPRING HANGER = 2050mm.
 3. SPRING CONSTANT = 533.3N/mm.

1. SUSPENSION BRACKETS AS SHOWN SHALL ALSO BE SUPPLIED ALONG WITH UPPER VALVE BY THE VALVE SUPPLIER.
2. INITIAL COMPRESSION OF SPRING HANGER = 20000N.
3. SPRING CONSTANT = 533.3N/mm.

[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 material.	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
B.6	HPSU water coller diagram/ detailed technical catalogues including type/size of end connections for water inlet /outlet & FRF inlet / outlet.	YES	NO
B.7	HPSU cooler data sheet	YES	NO
B.8	HPSU cooler GA drawing	YES	NO
B.9	Part list & drawing of flushing device	YES	NO

B.10	Heater- Rating/ Power consumption	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
C.10	Enthalpy based control philosophy	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 Desuperheater:</u>			
E.1	Sizing calculations for desuperheater	YES	NO
E.2	Data sheet and/or Separate arrangement drawings of desuperheater indicating therein the materials, weld edge detail, total weight, overall dimensions, centre of gravity etc.	YES	NO
<u>F. Documents related to all the offered equipments:</u>			
F.1	List of commissioning spares for all the offered equipments.	YES	NO
F.2	Priced list of recommended spares for future ordering.	YES	NO
F.3	Detailed 'Quality Plan' for the offered equipments. (As per clause no. 10.0 of ST 47050).	YES	NO
F.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
6.	Desuperheater sizing calculation	STE-TG
8.	HPSU water cooler diagram/ detailed technical catalogues including type/size/material of end connections for water inlet/outlet.	STE-TG
9.	Feed forward philosophy (Enthalpy based control) for spray water	STE-TG
10.	Complete system write up for LPBP system	STE-TG
11.	CV test report	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.	GA drg. Of LPBP valve with Desuperheater indicating overall & dismantelling dimension and weight	
3.	WIV drawing, datasheet & bill of material	STE-TG
4.	HPSU GA drawing data sheet & bill of material	STE-TG
5.	HPSU schematics	STE-TG/CIE
6.	I & R Diagram system	STE-TG/CIE
7.	Steam blowing device & bill of material	STE-TG
8.	Details of Oil/FRF flushing device	STE-TG
9.	Flow nozzle datasheet as per ISO 5167	CIE
10.	Flow nozzle drawing	CIE
11.	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.	WPS field piping for the system and recommendations	STE-TG/HXE
6.	Instructions for sequence of erection & commissioning along with supporting drawings/sketches	STE-TG
7.	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.

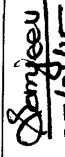
MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN				TO BE FILLED BY BHEL				TO BE FILLED BY BHEL			
BHEL		VENDOR'S NAME		LP BYPASS SYSTEM		ITEM	LP BYPASS SYSTEM	QP NO.	QA/BI/QP/114	REMARKS					
		DRG. NO.		AS PER PO		DATED	10/09/2014								
		SPEC.		AS PER PO											
		REV		02											
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			

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

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	-	IBR FORM
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
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MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN				TO BE FILLED BY BHEL				TO BE FILLED BY BHEL			
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				DRG. NO.	AS PER PO		DATED	10/09/2014							
				SPEC.	AS PER PO										
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SL. NO.	COMPONENT & OPERATIONS	3	4	5	6	7	8	9	10	11					
1	2	3	4	5	6	7	8	9	10	11					

3.5	DIMENSION & WALL THICKNESS CHECK	WELDING+ MAIN DIMENSION	MAJOR	MEASUREMENT	ALL VALVES	AS PER DRAWING	TC	N	P	V	
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		

MANUFACTURER'S NAME AND ADDRESS		STANDARD QUALITY PLAN		TO BE FILLED BY BHEL		TO BE FILLED BY BHEL	
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				CHARACTERISTICS		CLASS	TYPE OF CHECK
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						10	11

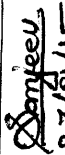
MANUFACTURER'S NAME AND ADDRESS		STANDARD QUALITY PLAN		TO BE FILLED BY BHEL		TO BE FILLED BY BHEL	
BHEL		VENDOR'S NAME		ITEM	LP BYPASS SYSTEM		Q.P. NO.
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				DRG. NO.	AS PER PO		DATED	10/09/2014							
				SPEC.	AS PER PO										
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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

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

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		APPROVED BY  27/01/15 संजीव कुमार भारद्वाज Sanjeev Kumar Bhatnagar अभियन्ता/Engineer गुणता आश्वासन/Quality Assurance बी. एच. ई. एल., इंदौर/BHEL Indore	

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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/JP/114										
				DRG. NO.	AS PER PO	DATED	10/09/2014										
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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	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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MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN				TO BE FILLED BY BHEL				TO BE FILLED BY BHEL						
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1		2		3		4	5		6	7	8		9		10			
																	11	
2.5		TOPASSLY		A.DEMENSION / VISUAL		MAJOR		DIMENSIONAL / VISUAL		ALL VALVES		TOPASSLY DRWG.		-		N		ASSEMBLED WITH ACTUATOR
				B.PAINT		-		VISUAL		ALL VALVES		VENDOR'S STANDARD		-		N		
				C.PACKING		-		VISUAL		ALL VALVES		BHEL P.O. VENDOR'S STANDARD		-		N		

		FOR CUSTOMER USE	APPROVED BY
MANUFACTURER/SUB CONTRACTOR			

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

27/01/15

संजीव कुमार भारद्वाज

Sanjeev Kumar Bhardwaj

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

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MANUFACTURER/SUB CONTRACTOR				

संजीव कुमार भारद्वाज
 Sanjeev Kumar Bhargava
 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			
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SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS		CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS		FORMAT OF RECORDS		AGENCY		REMARKS		
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3.3	DIMENSION CHECK	WELDEND + MAIN DIMENSION		MAJOR	DIMENSIONAL	PERPIECE	DRAWING			TC	V	P	W			
3.4	CALIBRATION REPORT			MAJOR	VISUAL	PERPIECE				COC	V	P	V			
4	FINAL INSPECTION PACK -& SHIPPING	VERIFICATION OF COMPLETION STAMPING PACKING		MAJOR	VISUAL	100%	AS PER APPROVED DRAWING/ DATASHEET			COC	V	P	V			

MANUFACTURER/SUB CONTRACTOR		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	FOR CUSTOMER USE	APPROVED BY	<i>Sanjeev</i> 27/01/15 संजीव कुमार भारद्वाज Sanjeev Kumar Bhardwaj अभियन्ता/Engineer गुणता आश्वासन/Quality Assurance बी. एच. ई. एल., बलिया/BIHEL Balia

