

1. Introduction

LP bypass system is used to dump reheat steam from boiler to condenser (bypassing the intermediate and low pressure Steam Turbines). It also reduces the parameters of reheat steam suiting to condenser parameters.

2. Components of LP bypass system:

LP bypass system consists of the following components:

- A. Pressure reducing control valves:** Bypass valve can be of two type either single stem or double stem. For single stem bypass valve, flow shut off function and control function is achieved through single valve while for double stem there are separate stop and control valve for flow shut off and for control function respectively. In double stem bypass valve both stop and control valve are housed in a single casing.
- B. Electro-hydraulic actuators:** Bypass valve is equipped with Electro hydraulic actuators. Function of actuators is to open and close the valve and provide required seat tightness when valve is in closed condition. Fire resistant fluid is used as working medium.
- C. Desuperheater:** Desuperheater is an integral part of valve body and is located at downstream of control valve. It is equipped with nozzles from which cooling water is sprayed. Upon passing through nozzles, cooling water gets atomized and mixes with outlet steam to bring its temperature down.
- D. Water injection valve:** Water injection valve regulates the cooling water flow to desuperheater and supplies the cooling water as per system requirement. Quantity of water to be injected is calculated through *enthalpy based control* philosophy.
- E. HPSU (Hydraulic power supply unit):** Its main function is to supply the working fluid to various actuators at predefined pressure. HPSU shall be provided with control fluid pumps (2X100%), filters, hydraulic accumulators, check valves, pressure and temperature measuring instruments, level measuring instruments, cooling cum filtration unit and regeneration unit.
- F. Flow nozzle:** it is used to measure the cooling water flow that is supplied by the water injection valve.
- G. Dump Tube:** Dump tube accepts the flow from desuperheater and dumps the steam into condenser.

Worked by	Adarsh Kumar Singh
Checked by	Nawnit Nirala/ Shubham Mittal
Approved by	Rajeev Rawat
COPYRIGHT AND CONFIDENTIAL: The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	

BHEL

**TECHNICAL OVERVIEW OF
LP BYPASS SYSTEM**

Doc. NO.: 4-12300-00001
Rev 00

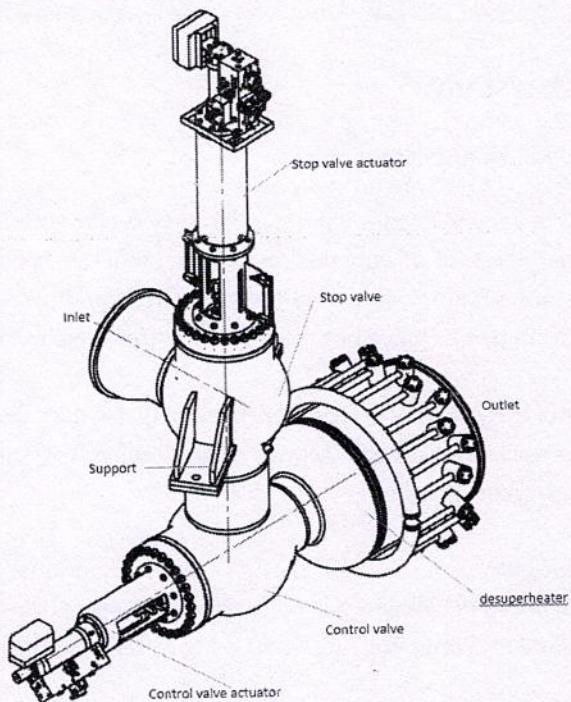


Figure-1: Overview of bypass valve

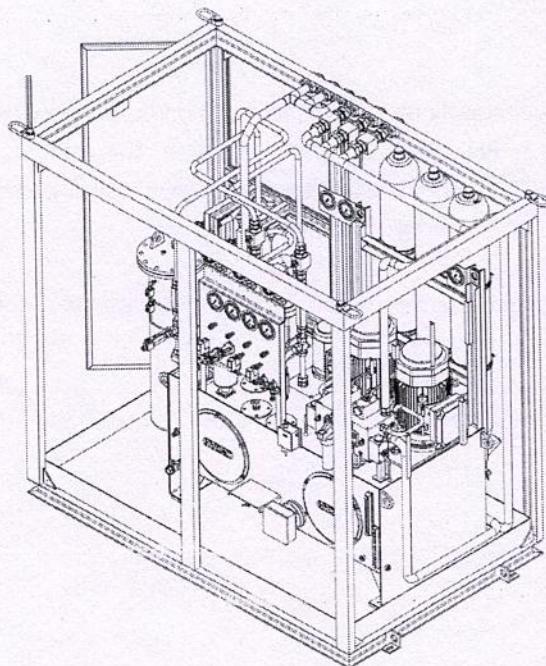


Figure-2: Overview of Hydraulic power supply unit

Worked by	Adarsh Kumar Singh
Checked by	Nawnit Nirala/ Shubham Mittal
Approved by	Rajeev Rawat
COPYRIGHT AND CONFIDENTIAL: The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	

3. Major design parameters (Typical):

A. For LP Bypass Valve

Design pressure: 82 bar

Design temperature: 610 Deg C

Max volumetric flow: 32 m³/s

B. For water injection valve

Design pressure: 47 bar

Design temperature: 100 Deg C

Max flow: 123 Kg/s

C. For Hydraulic Power Supply Unit:

Tank capacity: 650 lit

Max. Oil pressure: 160 bar

D. Operating fluid: Fire resistant fluid (phosphoate ester based)

E. Type of LP bypass valve: Single stem or Double stem

F. Quick closing time: less than 1 sec.

G. Other requirements shall be as per BHEL specifications and drawings

4. Brief 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 specification.

- a. Detailed functional design, calculation, analysis & engineering of all equipment, systems, all spares, special tools for assembly and disassembly of various equipment's & steam blowing devices.
- b. Material procurement
- c. Complete manufacturing including functional testing

The responsibility of correct design, manufacturing and testing & hence proper functioning of LP bypass system at site rests with the supplier.

5. General Scope of supply for 1 TG set:

Scope of supply shall be as per table below:

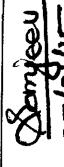
SL. No.	Description	Quantity/TG set
1	LP Bypass Valve with EHA & Desuperheater	02 Sets
2	Hydraulic Power Supply Unit (HPSU)	01 Set
3	Water Injection Control Valve with Hydraulic Actuator	02 Nos.
4	Flow Nozzle for WIV	02 Nos.
5	Dump Tube	02 Nos.

Worked by	Adarsh Kumar Singh
Checked by	Nawnit Nirala/ Shubham Mittal
Approved by	Rajeev Rawat
COPYRIGHT AND CONFIDENTIAL: The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	

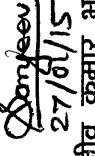
MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN							TO BE FILLED BY BHEL			
BHEL	VENDOR'S NAME	ITEM	LP BYPASS SYSTEM	QP NO.		QA/B1/QP/114		FORMAT OF RECORDS		AGENCY		REMARKS		
		DRG. NO.	AS PER PO	DATED		10/09/2014		M B N		10		11		
		SPEC.	AS PER PO	REV	02	Page 1 of 11		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS		AGENCY		
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	6	7	7	8	9	D	10	M B N	REMARKS
1	2	3	4	5										
LP BYPASS STOP & CONTROL VALVE														
1.0	RAW MATERIAL	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERHEAT	AS PER APPROVED DATASHEET		TC	✓	P	V			
1.1	VALVE BODY	B. MECHANICAL PROPERTIES	MAJOR	-MECH TEST	PERHEAT	AS PER APPROVED DATASHEET		TC	✓	P	V			
		C. NDT	MAJOR	UT	100% (EXCEPT WELD ENDS) ON WELD ENDS	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% (EXCEPT WELD ENDS) ON WELD ENDS	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	UTMPI	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	UTMPI	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			
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 'C/P' OF CUSTOMER										FOR CUSTOMER USE		APPROVED BY		
MANUFACTURER/SUB CONTRCTOR												Sanjeev Kumar Bhardwaj 27/05/2015 संजीव कुमार भर्डाव Sanjeev Kumar Bhardwaj अभियंकन/Engineer गुणता आशयस्थ/Quality Assurance बी.ए.ई.एल., हरिद्वार/BHEL Haridwar		

MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN					
BHEL	VENDOR'S NAME	ITEM	LP BYPASS SYSTEM	QP NO.		TO BE FILLED BY BHEL			
		DRG. NO.	AS PER PO	DATE	QA/B1/QP/114 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 M B N
1	2	3	4	5	6	7	8	9	10 D 11

Page 2 of 11									
		B.MECHANICAL PROPERTIES	MAJOR	-MECH.TEST	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P V
		C.NDT	MAJOR	UTMPI	100%	AS PER APPROVED DATASHEET	TC	✓	P V
1.6	BOLTS/NUTS	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
1.7	ACTUATOR	CHECKS ON ACTUATOR	MAJOR	TCREVIEW	PERPIECE	AS PER APPROVED DATASHEET	COC	✓	P V
2.0	MANUFACTURING								
2.1	MACHINING PARTS	VISUAL& DIMENSIONAL INSPECTION	MAJOR	VISUAL/ MEASUREMENT	PERPIECE	SHOP TRAVELER	-	✓	P
2.2	WELDING & HEAT TREATMENT	WPS	MAJOR	VISUAL TIME/TEMPERATURE	PERPIECE	EN287 / ASME IX	✓	✓	P
2.3	ASSEMBLY	ASSY.DRWG.	MAJOR	VISUAL	PERPIECE	AS PER APPROVED ASSY.DRAWING	✓	✓	P
3.0	TESTING & INSPECTION								
3.1	NDEWELDING	RT/UT	MAJOR	RT/UT	PERPIECE	ASME SEC. V/VII/HW0980830	TC	✓	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	✓	P W - IN CASE OF RT VERIFICATION OF X-RAY FILM
3.3	HYDROSTATIC PRESSURE TEST	ASSY.DRWG.	MAJOR	HYDRAULIC TEST	ALL VALVES	AS PER APPROVED DATASHEET/ DRAWING	TC	✓	P W - IFRFORM
3.4	SEATLEAKAGE	ASSY.DRWG.	MAJOR	LEAKAGE TEST	ALL VALVES	AS PER APPROVED DATASHEET/ DRAWING	TC	✓	P W -

LEGEND: 1 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	FOR CUSTOMER USE	APPROVED BY
MANUFACTURER/SUB CONTRCTOR				 27/09/15 संजीव कुमार भरद्वाज गुणवा अधिकारी/Quality Assurance वी.ए. इ.एल. हरिहर/BHEL Hardiwar

MANUFACTURER'S NAME AND ADDRESS				STANDARD QUALITY PLAN							
BHEL	VENDOR'S NAME	ITEM	LP BYPASS SYSTEM	QP NO.		TO BE FILLED BY BHEL		TO BE FILLED BY BHEL			
		DRG. NO.	AS PER PO	DATED	QA/B1/QP/114						
		SPEC.	AS PER PO				10/09/2014				
		REV	02				Page 3 of 11				
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY	REMARKS	
1	2	3	4	5	6	7	8	9	D	10 11	
3.5	WELDING+ MAIN DIMENSION & WALL-THICKNESS CHECK	MAJOR	MEASUREMENT	ALL VALVES	AS PER DRAWING	TC	V	P	V		
3.6	NDE MACHINED PT	MAJOR	PT	ALL VALVES	AS PER APPROVED DATASHEET/ DRAWING	TC	V	P	V		
3.7	FUNCTION / PERFORMANCE TEST	FUNCTIONAL TEST AS PERAPPROVED TEST PROCEDURE	MAJOR	PERFORMANCE	ALL VALVES	AS PER APPROVED DATASHEET/ DRAWING	TC	V	P	W	
	NOISELEVEL	CONFIRMATION FOR MEETING NOISE LEVEL	MAJOR	NOISETEST				P	V	ACTUATOR +VALVE	
3.8	CV TEST		MAJOR	CV TEST	PERDESIGN	AS PER APPROVED DATASHEET/ DRAWING	TC	V	P	V	
3.9	PAINTING,PACKI NG AND PRESERVATION		MAJOR	VISUAL	ALL VALVES	VENDOR'S STANDARD	-	V	P		

MANUFACTURER/SUB CONTRACTOR	LEGEND: ! RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.	FOR CUSTOMER USE	APPROVED BY
	M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER		 Sanjeev Kumar Bhardwaj 27/8/15 संजीव कुमार भारद्वाज श्रृंग आश्रम समन्वय असर्टेन्स अधिकारी/Engineer बी.ए. डॉ. ए.एल., इंजिनियर BHEL, Hantwara

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

HPSU									
1	INCOMING MATERIAL CONTROL								
1.1	OILTANK	DAMAGE	MAJOR	VISUAL	100%	MANUFACTURERDRAWING	CO.C	V	P V
		DIMENSIONS	MINOR	MEASURMENT	100%	MANUFACTURERDRAWING	CO.C	V	P V
		VERIFICATION OF SUPPLIER CERTIFICATE, IDENTIFICATION & CORELATION TOTCS FORRAWMATERIAL PLATES	MAJOR	CERTIFICATE REVIEW	100%	MANUFACTURERDRAWING	CO.C	V	P V
1.2	BOUGHT OUT ITEMS								
	LEVEL TRANSMITTER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V
		MODELCODE	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V
		CALIBRATION	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V
	PRESSURE TRANSMITTER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V
		MODELCODE	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V
		CALIBRATION	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V
	TEMPERATURE TRANSMITTER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V
		MODELCODE	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V
		CALIBRATION	MAJOR	VISUAL	100%	DRG./DATASHEET	CO.C	V	P V

FOR CUSTOMER USE

ME MANUFACTURER / SUBCONTRACTOR B- RHEI / NOM INSPECTION SERVICES

CUSTOMER , SUBJECT TO CONSTRUCTION BY BTEL / NOWI. INSPECTION AGENCY N:
INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION
ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER

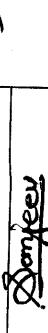
104

Sanjeev
27/01/15
संजीव कुमार भारद्वाज
Sanjeev Kumar Bhardwaj

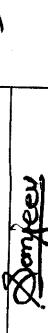
अभियंता/Engineer
गुणा अशायन/Quality Assurance
बी. ए. पृष्ठ., हाईट्रीड ऐंजिनियरिंग

MANUFACTURER'S NAME AND ADDRESS			STANDARD QUALITY PLAN										
BHEL	VENDOR'S NAME	ITEM	LP BYPASS SYSTEM		QP NO.	TO BE FILLED BY BHEL		TO BE FILLED BY BHEL					
		DRG. NO.	AS PER PO	DATED	QA/B1/QP/114 10/09/2014								
		SPEC.	AS PER PO										
		REV	02										
SL. NO.			COMPONENT & OPERATIONS		CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	10	M B N	10	11	

THREE PHASE MOTORS	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
MODEL CODE	MAJOR	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
VERIFICATION OF SUPPLIER CERTIFICATE	MAJOR	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
ACCUMULATOR S	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
MODEL CODE	MAJOR	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
PRESSURE TEST	MAJOR	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
PRESSURE RELIEF VALVES	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
MODEL CODE	MAJOR	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
ADJUSTMENT	MAJOR	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
PRESSURE GAUGES	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
MODEL CODE	MAJOR	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
CALIBRATION	MAJOR	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
THERMOMETER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
CFAR COOLER	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	
COOLING CUM FILTRATION	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	V	P	V	

MANUFACTURER/SUB CONTRACTOR	LEGEND: 1 RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.	FOR CUSTOMER USE	APPROVED BY
	M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER		 Sanjeev Kumar Bhardwaj संजीव कुमार भारद्वाज अभियंका/Engineer श्री. ए. इ. एन., हरिहर BHEL Hardwa

21


Sanjeev Kumar Bhardwaj
 संजीव कुमार भारद्वाज
 अभियंका/Quality Assurance
 श्री. ए. इ. एन., हरिहर BHEL Hardwa

ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER

FOR CUSTOMER USE

APPROVED BY

27/01/15

Sanjeev Kumar Bhardwaj

श्री. ए. इ. एन., हरिहर BHEL Hardwa

Page 5 of 11

MANUFACTURER'S NAME AND ADDRESS			STANDARD QUALITY PLAN						
BHEL	VENDOR'S NAME	ITEM	LP BYPASS SYSTEM			QP NO.	TO BE FILLED BY BHEL		
		DRG. NO.	AS PER PO			QA/B/QP/114 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
								10	11

Page 6 of 11									
	CFPUMPS	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P
	GEARPUMPS	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P
	COUPLING	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P
	FILTERS	DAMAGE, RUST	MAJOR	VISUAL	100%	DRG./DATASHEET	COC	✓	P
2	FUNCTION TEST /FINAL INSPECTION					DRG./DATASHEET	COC	✓	P
2.1	HPSU	DIMENSIONS	MAJOR	MEASUREMENT	100%	AS PER DRAWING	TC	✓	P W
2.2	HPSU	CORRECT FITMENT	MAJOR	VISUAL	100%	AS PER DRAWING/CIRCUIT DIAGRAM	TC	✓	P W
2.3	HPSU	FUNCTION TEST	MAJOR	MEASUREMENT	100%	FP_0019	TC	✓	P W
2.4	HPSU	PAINTING	MAJOR	VISUAL	100%	DRG./VENDORPROCEDURE	-	✓	P

MANUFACTURER/SUB CONTRACTOR	LEGEND:		FOR CUSTOMER USE
	I. RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.	II. MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N:	
	III. CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION	IV. ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER	APPROVED BY Sanjeev Kumar Bhardwaj संजीव कुमार भर्डवाज Engineer 27/01/15 गणेश अशोक/Quality Assurance वा. एस. ई.एल., हारिदगरBHEL Hardware

MANUFACTURER'S NAME AND ADDRESS			STANDARD QUALITY PLAN		
BHEL	VENDOR'S NAME	ITEM	LP BYPASS SYSTEM	QP NO.	TO BE FILLED BY BHEL
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QP/DATED
1	2	3	4	5	QA/B1/QP/114 10/09/2014
		REV 02			Page 7 of 11

WATER INJECTION VALVES

1.0	RAW MATERIAL	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12	1.13	1.14	1.15	1.16	1.17	1.18	1.19	1.20	1.21	1.22	1.23	1.24	1.25	1.26	1.27	1.28	1.29	1.30	1.31	1.32	1.33	1.34	1.35	1.36	1.37	1.38	1.39	1.40	1.41	1.42	1.43	1.44	1.45	1.46	1.47	1.48	1.49	1.50	1.51	1.52	1.53	1.54	1.55	1.56	1.57	1.58	1.59	1.60	1.61	1.62	1.63	1.64	1.65	1.66	1.67	1.68	1.69	1.70	1.71	1.72	1.73	1.74	1.75	1.76	1.77	1.78	1.79	1.80	1.81	1.82	1.83	1.84	1.85	1.86	1.87	1.88	1.89	1.90	1.91	1.92	1.93	1.94	1.95	1.96	1.97	1.98	1.99	1.100	1.101	1.102	1.103	1.104	1.105	1.106	1.107	1.108	1.109	1.110	1.111	1.112	1.113	1.114	1.115	1.116	1.117	1.118	1.119	1.120	1.121	1.122	1.123	1.124	1.125	1.126	1.127	1.128	1.129	1.130	1.131	1.132	1.133	1.134	1.135	1.136	1.137	1.138	1.139	1.140	1.141	1.142	1.143	1.144	1.145	1.146	1.147	1.148	1.149	1.150	1.151	1.152	1.153	1.154	1.155	1.156	1.157	1.158	1.159	1.160	1.161	1.162	1.163	1.164	1.165	1.166	1.167	1.168	1.169	1.170	1.171	1.172	1.173	1.174	1.175	1.176	1.177	1.178	1.179	1.180	1.181	1.182	1.183	1.184	1.185	1.186	1.187	1.188	1.189	1.190	1.191	1.192	1.193	1.194	1.195	1.196	1.197	1.198	1.199	1.200	1.201	1.202	1.203	1.204	1.205	1.206	1.207	1.208	1.209	1.210	1.211	1.212	1.213	1.214	1.215	1.216	1.217	1.218	1.219	1.220	1.221	1.222	1.223	1.224	1.225	1.226	1.227	1.228	1.229	1.230	1.231	1.232	1.233	1.234	1.235	1.236	1.237	1.238	1.239	1.240	1.241	1.242	1.243	1.244	1.245	1.246	1.247	1.248	1.249	1.250	1.251	1.252	1.253	1.254	1.255	1.256	1.257	1.258	1.259	1.260	1.261	1.262	1.263	1.264	1.265	1.266	1.267	1.268	1.269	1.270	1.271	1.272	1.273	1.274	1.275	1.276	1.277	1.278	1.279	1.280	1.281	1.282	1.283	1.284	1.285	1.286	1.287	1.288	1.289	1.290	1.291	1.292	1.293	1.294	1.295	1.296	1.297	1.298	1.299	1.300	1.301	1.302	1.303	1.304	1.305	1.306	1.307	1.308	1.309	1.310	1.311	1.312	1.313	1.314	1.315	1.316	1.317	1.318	1.319	1.320	1.321	1.322	1.323	1.324	1.325	1.326	1.327	1.328	1.329	1.330	1.331	1.332	1.333	1.334	1.335	1.336	1.337	1.338	1.339	1.340	1.341	1.342	1.343	1.344	1.345	1.346	1.347	1.348	1.349	1.350	1.351	1.352	1.353	1.354	1.355	1.356	1.357	1.358	1.359	1.360	1.361	1.362	1.363	1.364	1.365	1.366	1.367	1.368	1.369	1.370	1.371	1.372	1.373	1.374	1.375	1.376	1.377	1.378	1.379	1.380	1.381	1.382	1.383	1.384	1.385	1.386	1.387	1.388	1.389	1.390	1.391	1.392	1.393	1.394	1.395	1.396	1.397	1.398	1.399	1.400	1.401	1.402	1.403	1.404	1.405	1.406	1.407	1.408	1.409	1.410	1.411	1.412	1.413	1.414	1.415	1.416	1.417	1.418	1.419	1.420	1.421	1.422	1.423	1.424	1.425	1.426	1.427	1.428	1.429	1.430	1.431	1.432	1.433	1.434	1.435	1.436	1.437	1.438	1.439	1.440	1.441	1.442	1.443	1.444	1.445	1.446	1.447	1.448	1.449	1.450	1.451	1.452	1.453	1.454	1.455	1.456	1.457	1.458	1.459	1.460	1.461	1.462	1.463	1.464	1.465	1.466	1.467	1.468	1.469	1.470	1.471	1.472	1.473	1.474	1.475	1.476	1.477	1.478	1.479	1.480	1.481	1.482	1.483	1.484	1.485	1.486	1.487	1.488	1.489	1.490	1.491	1.492	1.493	1.494	1.495	1.496	1.497	1.498	1.499	1.500	1.501	1.502	1.503	1.504	1.505	1.506	1.507	1.508	1.509	1.510	1.511	1.512	1.513	1.514	1.515	1.516	1.517	1.518	1.519	1.520	1.521	1.522	1.523	1.524	1.525	1.526	1.527	1.528	1.529	1.530	1.531	1.532	1.533	1.534	1.535	1.536	1.537	1.538	1.539	1.540	1.541	1.542	1.543	1.544	1.545	1.546	1.547	1.548	1.549	1.550	1.551	1.552	1.553	1.554	1.555	1.556	1.557	1.558	1.559	1.560	1.561	1.562	1.563	1.564	1.565	1.566	1.567	1.568	1.569	1.570	1.571	1.572	1.573	1.574	1.575	1.576	1.577	1.578	1.579	1.580	1.581	1.582	1.583	1.584	1.585	1.586	1.587	1.588	1.589	1.590	1.591	1.592	1.593	1.594	1.595	1.596	1.597	1.598	1.599	1.5100	1.5101	1.5102	1.5103	1.5104	1.5105	1.5106	1.5107	1.5108	1.5109	1.5110	1.5111	1.5112	1.5113	1.5114	1.5115	1.5116	1.5117	1.5118	1.5119	1.5120	1.5121	1.5122	1.5123	1.5124	1.5125	1.5126	1.5127	1.5128	1.5129	1.5130	1.5131	1.5132	1.5133	1.5134	1.5135	1.5136	1.5137	1.5138	1.5139	1.5140	1.5141	1.5142	1.5143	1.5144	1.5145	1.5146	1.5147	1.5148	1.5149	1.5150	1.5151	1.5152	1.5153	1.5154	1.5155	1.5156	1.5157	1.5158	1.5159	1.5160	1.5161	1.5162	1.5163	1.5164	1.5165	1.5166	1.5167	1.5168	1.5169	1.5170	1.5171	1.5172	1.5173	1.5174	1.5175	1.5176	1.5177	1.5178	1.5179	1.5180	1.5181	1.5182	1.5183	1.5184	1.5185	1.5186	1.5187	1.5188	1.5189	1.5190	1.5191	1.5192	1.5193	1.5194	1.5195	1.5196	1.5197	1.5198	1.5199	1.5100	1.5101	1.5102	1.5103	1.5104	1.5105	1.5106	1.5107	1.5108	1.5109	1.5110	1.5111	1.5112	1.5113	1.5114	1.5115	1.5116	1.5117	1.5118	1.5119	1.5120	1.5121	1.5122	1.5123	1.5124	1.5125	1.5126	1.5127	1.5128	1.5129	1.5130	1.5131	1.5132	1.5133	1.5134	1.5135	1.5136	1.5137	1.5138	1.5139	1.5140	1.5141	1.5142	1.5143	1.5144	1.5145	1.5146	1.5147	1.5148	1.5149	1.5150	1.5151	1.5152	1.5153	1.5154	1.5155	1.5156	1.5157	1.5158	1.5159	1.5160	1.5161	1.5162	1.5163	1.5164	1.5165	1.5166	1.5167	1.5168	1.5169	1.5170	1.5171	1.5172	1.5173	1.5174	1.5175	1.5176	1.5177	1.5178	1.5179	1.5180	1.5181	1.5182	1.5183	1.5184	1.5185	1.5186	1.5187	1.5188	1.5189	1.5190	1.5191	1.5192	1.5193	1.5194	1.5195	1.5196	1.5197	1.5198	1.5199	1.5100	1.5101	1.5102	1.5103	1.5104	1.5105	1.5106	1.5107	1.5108	1.5109	1.5110	1.5111	1.5112	1.5113	1.5114	1.5115	1.5116	1.5117	1.5118	1.5119	1.5120	1.5121	1.5122	1.5123	1.5124	1.5125	1.5126	1.5127	1.5128	1.5129	1.5130	1.5131	1.5132	1.5133	1.5134	1.5135	1.5136	1.5137	1.5138	1.5139	1.5140	1.5141	1.5142	1.5143	1.5144	1.5145	1.5146	1.5147	1.5148	1.5149	1.5150	1.5151	1.5152	1.5153	1.5154	1.5155	1.5156	1.5157	1.5158	1.5159	1.5160	1.5161	1.5162	1.5163	1.5164	1.5165	1.5166	1.5167	1.5168	1.5169	1.5170	1.5171	1.5172	1.5173	1.5174	1.5175	1.5176	1.5177	1.5178	1.5179	1.5180	1.5181	1.5182	1.5183	1.5184	1.5185	1.5186	1.5187	1.5188	1.5189	1.5190	1.5191	1.5192	1.5193	1.5194	1.5195	1.5196	1.5197	1.5198	1.5199	1.5100	1.5101	1.5102	1.5103	1.5104	1.5105	1.5106	1.5107	1.5108	1.5109	1.5110	1.5111	1.5112	1.5113	1.5114	1.5115	1.5116	1.5117	1.5118	1.5119	1.5120	1.5121	1.5122	1.5123	1.5124	1.5125	1.5126	1.5127	1.5128	1.5129	1.5130	1.5131	1.5132	1.5133	1.5134	1.5135	1.5136	1.5137	1.5138	1.5139	1.5140	1.5141	1.5142	1.5143	1.5144	1.5145	1.5146	1.5147	1.5148	1.5149	1.5150	1.5151	1.5152	1.5153	1.5154	1.5155	1.5156	1.5157	1.5158	1.5159	1.5160	1.5161	1.5162	1.5163	1.5164	1.5165	1.5166	1.5167	1.5168	1.5169	1.5170	1.5171	1.5172	1.5173	1.5174	1.5175	1.5176	1.5177	1.5178	1.5179	1.5180	1.5181	1.5182	1.5183	1.5184	1.5185	1.5186	1.5187	1.5188	1.5189	1.5190	1.5191	1.5192	1.5193	1.5194	1.5195	1.5196	1.5197	1.5198	1.5199	1.5100	1.5101	1.5102	1.5103	1.5104	1.5105	1.5106	1.5107	1.5108	1.5109	1.5110	1.5111	1.5112	1.5113</th

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

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 'W' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER	FOR CUSTOMER USE	APPROVED BY
			<i>Sanjeev Kumar Ehardwai</i> 27/09/15 संजीव कुमार भारद्वाज Sanjeev Kumar Ehardwai अभियंक्ता/Engineer B. एव. इ. एल., कर्मचारी/Quality Assurance वै. एव. इ. एल., कर्मचारी/BHEL Handover

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

FLOW NOZZLE FOR WIV

1.0	RAW MATERIAL	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERLOT	AS PER APPROVED DATASHEET/ DRG.	TC	✓	P	V	
	BRANCH PIPE	B. MECHANICAL PROPERTIES	-MECH TEST			AS PER APPROVED DATASHEET/ DRG.	TC	✓	P	V	
		C.NDT	UT			AS PER APPROVED DATASHEET/ DRG.	TC	✓	P	V	
	FLOWNOZZLE	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	-DO-	AS PER APPROVED DATASHEET/ DRG.	TC	✓	P	V	
		B. MECHANICAL PROPERTIES		-MECH TEST		AS PER APPROVED DATASHEET/ DRG.	TC	✓	P	V	
2.0	MANUFACTURING					AS PER APPROVED DATASHEET/ DRG.	TC	✓	P	V	
2.1	MACHINING PARTS	VISUAL& DIMENSIONAL INSPECTION	MAJOR	VISUAL/ DIMENSIONAL	PERPIECE	SHOP TRAVELER	TC	✓	P	V	
2.2	WELDING & HEAT TREATMENT	SEEDRAWING	MAJOR		PERPIECE	EN288 / ASME IX	TC	✓	P	V	
2.3	ASSEMBLY	SEEDRAWING	MAJOR	VISUAL	PERDESIGN	AS PER APPROVED DATASHEET/ DRG.	TC	✓	P	V	
3.0	TESTING &INSPECTION						TC	✓	P	V	
3.1	NDEWELDING	RT OR UT	MAJOR	RT/UT	PERPIECE	ASME SEC V/VII/HW0980830	TC	✓	P	V	
	NDE MACHINED WELD END	PT	MAJOR	PT	PERPIECE	ASME SEC V/VIII/HW0980830	TC	✓	P	V	
3.2	HYDROSTATIC PRESSURETEST	PRESSURETEST	MAJOR	HYDRO	PERPIECE	AS PER APPROVED DATASHEET/ DRG./Follow HW0980829	TC	✓	P	V	

LEGEND:

MANUFACTURER/SUB CONTRACTOR	I. RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.	FOR CUSTOMER USE	APPROVED BY
	M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: _____		Sanjeev Kumar Bhardwaj Quality Engineer 27/01/15

Sanjeev Kumar Bhardwaj
Quality Engineer
27/01/15

टांजीव कुमार भारद्वाज
अभियंक्ता/Engineer
गणता अध्ययन/Quality Assurance
बी. एस. बी. एल., होरिंग/BHEL, रायपुर

MANUFACTURER'S NAME AND ADDRESS			STANDARD QUALITY PLAN			TO BE FILLED BY BHEL		
BHEL	VENDOR'S NAME	ITEM	LP BYPASS SYSTEM		QP NO. DATED	TO BE FILLED BY BHEL		
			DRG. NO.	AS PER PO		QA/B/QP/114 10/09/2014		
SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS
1	2	3	4	5	6	7	8	M B N 10 D 11
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:	FOR CUSTOMER USE	APPROVED BY
	! 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 'V' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER			
<i>Sanjeev Kumar Bhattacharya</i> <i>अधिकारी/Engineer</i> <i>गुणगति/Quality Assurance</i> <i>वी.ए. इ.ए., हेल्पर/BHEL Hardinge</i> <i>27/01/15</i>			

Sanjeev Kumar Bhattacharya
अधिकारी/Engineer
गुणगति/Quality Assurance
वी.ए. इ.ए., हेल्पर/BHEL Hardinge

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

DUMP TUBE

1.0	RAW MATERIAL	A. CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P V	
	1.1 DUMP TUBE	B. MECHANICAL PROPERTIES	MAJOR	-MECH. TEST	PERHEAT	AS PER APPROVED DATASHEET	TC	✓	P V	
		C.NDT	MAJOR	UT	100	AS PER APPROVED DATASHEET	TC	✓	P V	
2.0	IN PROCESS									
2.1	WELDING & HEAT TREATMENT	WPS	MAJOR	VISUAL TIME/TEMPERATURE	PERPIECE	ASMEIX /EN288	✓	P		
2.2	NDE WELDING	RT MP/DP	MAJOR	RT MP/DP	PERPIECE	ASME SEC. V/VIII/ HW0980830	TC	✓	P W	

MANUFACTURER/SUB CONTRACTOR	LEGEND:	
	! RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.	FOR CUSTOMER USE
M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N:		APPROVED BY
C: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION		<i>Sanjeev Kumar Bherwani</i> 27/10/15
ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'C/P' OF CUSTOMER		राजीव कुमार भेरवानी गुरुग्राम/Quality Assurance वी.ए. इ.एल., होटेल/BHEL Haryana