PATRATU VIDYUT UTPADAN NIGAM LIMITED (PVUNL)

3X800MW PATRATU TPP PHASE-1

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VOLUME – II B

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TECHNICAL SPECIFICATION FOR HYDROGEN GENERATION PLANT

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SPECIFICATION NO. PE-TS-434-168-A001, R0

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BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

CONTENTS

PROJECT INFORMATION

CLAUSE NO.	PROJECT INFORMATION

PATRATU STPS EXPANSION PHASE-I (3X800 MW)

1.00.00 BACKGROUND

A Memorandum of Agreement (MOA) has been entered on 29.07.2015 amongst Govt. of Jharkhand (GoJ), Jharkhand Urja Vikash Nigam Limited (JUVNL), Jharkhand UrjaUtpadan Nigam Limited (JUUNL), Jharkhand BijliVitaran Nigam Limited (JBVNL) and NTPC Limited to form a Joint Venture Company of NTPC Limted& JBVNL for transfer of Patratu Thermal Power Station (PTPS) located in Ramgarh District of Jharkhand State to the proposed JV Company for Performance Improvement of existing capacity & 4000 MW Capacity expansion of PTPS.

Further to signing of JV agreement on 29.07.2015, a Joint Venture Company namely Patratu Vidyut Utpadan Nigam Limited (PVUNL) has been incorporated amongst GoJ, JUVNL, JBVNL and NTPC Ltd. on 15.10.2015. The Performance Improvement of existing capacity and 4000 MW Capacity expansion of Patratu STPS will be implemented by the JV Company (JVC). The configuration of expansion of 4000 MW shall consist of 5 units of 800 MW to be implemented in two phases; Phase-I: 3x800 MW and Phase-II: 2x800 MW.

The present proposal is for Patratu STPS Phase-I (3x800 MW). The project is envisaged to be commissioned during XIII Plan period.

2.00.00 CAPACITY

Patratu STPS Phase-I: 3x800 MW - Present proposal

3.00.00 MODE OF OPERATION

Base Load

4.00.00 LOCATION AND APPROACH

4.01.00 Patratu Thermal Power station (PTPS) is located just outside the coal belt of South Karanpura in Ramgarh District of Jharkhand State. The nearest Railway Station is Patratu which is at a distance of about 4 km on Barkakhana-Barwadih Railway line.

4.02.00 **The latitudes and longitudes of the site are as follows:**

Corner name	Latitude	Longitude
Top Corner	23° 38 ' 60 '' N	85° 17' 51.5" E
Bottom Corner	23° 38 '12.5 '' N	85° 17' 27" E
Left Corner	23° 38 ' 22.5 '' N	85° 17' 10.6 '' E
Right Corner	23° 38 ' 40 '' N	85° 17' 57 '' E

4.03.00 **Airport**

The nearest commercial airport is Ranchi at about 45 km by road.

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	A copy of Vicinity plan of the project site is placed at **Annexure - I**.
5.00.00	**LAND** The total land to be transferred to JV Company is 1859 acres. Out of 1859 acre, about 1234 acres of land has been envisaged for Plant, Ash pond and Land on railway track of the for Phase-I (3x800 MW). The balance 625 acre of land shall be transferred during commencement of Phase-II (2x800 MW).
6.00.00	**WATER** The make-up water for PSTPS is to be met from Patratu Dam on Nalkari River (capacity 99 MCM i.e. 110 Cusecs). About 52.34 Cusecs of water will be available at 90% dependable monsoon flow after considering evaporation loss. GoJ/JUVNL owns and controls water of Patratu Dam. GoJ/JUUNL supplies water to PTPS and to the other entities in the vicinity from this water reservoir. JUVNL had entered into agreements with these other entities for supply of water from water reservoir. JUVNL shall revisit these agreements to meet the requirement of water for expansion projects, if required. Make up water requirement of PSTPS, Phase-I (3x800 MW) would be about 27 Cusecs with "Air Cooled Condenser" based power plant. GoJ shall provide the required water from the existing reservoir to the JV Company. The JVC shall be responsible for the water supply arrangement starting at the downstream of intake chamber from where water supply commences for the Station. Ownership of the entire water supply system and related plant and equipment, including the water treatment plant, shall be that of the JVC and after the asset transfer, the JVC shall maintain, take care and use the same. The additional facility including addition of plant, equipment etc. for enhanced requirement (if any) and drawl of water shall be the responsibility of JVC and to be arranged by the JVC at their own cost.

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7.00.00	**COAL**
7.01.00	**Coal Requirement, Availability and Linkage** About 12 MTPA of coal will be required to meet coal requirement of the Phase-I (3x800 MW) of the project. The Banhardih captive coal block at a distance of about 155 km from plant is allocated to JUVNL for end use of Patratu expansion. The coal from Banhardih captive coal block shall be transferred to the JVC for the usage of PSTPS with the approval of Ministry of Coal, GOI. MOC (11.09.15) has accorded in-principle approval of the Central Govt. to assign Banhardih Coal Block allocated to JUVNL to the JV Company.
7.02.00	**Coal Transportation** The envisaged mode of coal transportation from the coal mines to the power plant is by Indian Railways through BOBR / BOX- N wagons.
7.03.00	**Coal Quality** The primary fuel for the main steam generator shall be coal. The domestic coal quality parameters are indicated in **Annexure-IV-2** and imported coal parameters are indicated in **Annexure-IV-4** are to be considered for steam generator design.
7.04.00	**Fuel Oil** The fuel oils to be used for start-up, coal flame stabilization and low load operation of the steam generator shall be Heavy Fuel Oils having the characteristics given at **Annexure-IV-3**and Light Diesel Oil having the characteristics given at **Annexure-IV-1.**
8.00.00	**NOT USED**
9.00.00	**STEAM GENERATOR TECHNOLOGY** The steam generators shall be super critical once through type, water tube, direct pulverized coal fired, top supported, balanced draft furnace, single reheat, radiant, dry bottom type, suitable for outdoor installation. The gas path arrangement shall be single pass (Tower type) or two pass type.
10.00.00	**FLUE GAS DESULPHURIZATION SYSTEM (FGD) &SCR:** The project is envisaged with Flue Gas Desulfurization (FGD) system and SCR meeting Ministry of Environment, Forest & Climate Change notification dated 07.12.2015. Limestone to be used for design of FGD system shall be as per the characteristic given at Annexure-IV-5.
11.00.00	**POWER EVACUATION SYSTEM** 85% of power from the project is envisaged to be allocated to Jharkhand State subject to approval of Ministry of Power, while balance 15% would be as unallocated portion and Project is envisaged as regional project. Since major power (85%) is proposed to be absorbed by Jharkhand, the issue of Associated Transmission

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	System for the project would be taken up with them for planning and execution of transmission system modalities as Inter-State System or ISTS System. Considering overall capacity of the project as 4000 MW, 765 kV step-up system has been envisaged. Two D/C 765 KV line, one each to New Ranchi (Bero) and Gaya has been envisaged. This would also form part of 765 kV transmission corridor connecting Ranchi to Gaya. These lines can be used to evacuate power to the Eastern Region ISTS as well as to Jharkhand State. In view of above, provision of four nos. of 765 kV outgoing Line bays has been kept in the new 765 kV generation switchyard. The issue of power evacuation of the proposed project shall be taken up with appropriate Transmission Utility (STU or CTU) as per regulatory provision, based on allocation of power.
12.00.00	**METEOROLOGICAL DATA** The meteorological data from nearest observatory is placed at **Annexure-II.**
13.00.00	**PLANT WATER SCHEME** The Plant water scheme is described below.
13.01.00	**Equipment Cooling Water (ECW) System (Unit Auxiliaries)** The plant auxiliaries of Steam Generator and Turbine Generator shall be cooled by Demineralized (DM) water in a closed circuit. The primary circuit DM water shall be cooled through plate type heat exchangers by Circulating Water tapped from ACW system in a secondary circuit. The station auxiliaries such as Air compressors, Compressors of ash handling plant, compressor of mill reject system etc. shall also be cooled by Demineralized (DM) water in a closed circuit .The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system. It is proposed to provide independent primary cooling water circuit for Steam Generator & auxiliaries and TG & its auxiliaries.
13.02.00	**Not used**
13.03.00	**Other Miscellaneous Water Systems** (a)The drinking water requirement of the plant shall be provided from water treatment plant. (b) Steam Cycle make-up water, makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water shall be provided from demineralizing plant. (c) The quality of Raw Water & DM Water is enclosed with this sub-section as **Annexure-III**. (d) Effluent from various areas in TG & SG system shall be collected in respective pits in their areas and pumped to a common terminal point as shown in plant water scheme.

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14.00.00	**CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT** All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in Part-B of this section.
15.00.00	**CRITERIA FOR WIND RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT** All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given as given in Part-B of this section.

SECTION – I
SPECIFIC TECHNICAL REQUIREMENTS
SUB-SECTION IA - Specific Technical Requirements (Mech.)
SUB-SECTION IB - Specific Technical Requirements (Electrical)
SUB-SECTION IC - Specific Technical Requirements (C & I)

SUB-SECTION – IA

SPECIFIC TECHNICAL REQUIREMENTS (MECHANICAL)

1.0 INTENT OF SPECIFICATION

1.1 The intend of spe cification is to cove r design (i.e. P reparation an d sub mission of dra wing/ documents in cluding " As Built " drawin gs an d O&M Manual s) , engineering, manufa cture, fabrication, a ssembly, inspectio n / testing at ven dor's & sub -vendor's works, pai nting, maintenance tools & tackles (a s appli cable), f ill of lubrica nts & consuma bles , mandatory spares al ong with spares for e rection , startup an d commissio ning as required, forwardi ng, proper packing, shipment and delivery at site , unloading, handli ng, transportation & storage at site, in site transportation, assembly, minor civil works, erection & commissioning, trial run at site and carryin g out perform ance g uarantee /Functional / Demonst ration tests at site , obtaining CCOE approval & final handing over to end cu stomer in flawl ess co ndition f or project and package specified above complete with all accessories for the total scope defined as per BHEL NIT & tender technical specification, amendment & agreements till placement of order.

1.2 The contract or shall b e resp onsible fo r prov iding al l material, eq uipment & se rvices, whi ch are required to fulfil the int ent of en suring operability, maintainability, reliability and complete safety of the complete wo rk cove red un der this specification, irre spective of wh ether it has been spe cifically listed herein or not. Omission of spe cific reference to any component / accessory necessary for proper performance of the equipment shall not relieve the contractor of the respo nsibility of providing such fa cilities t o com plete the sup ply, ere ction and commissioning, performance and guarantee of **HYDROGEN GENERATION PLANT.**

1.3 It is not the intent to speci fy herein all t he details of desi gn and manufacture. Howeve r, the equipment shall confo rm in all respe cts to highest standard s of design, e ngineering and workmanship and shall be cap able of performing the required duties in a manner acceptable to purcha ser who will int erpret the meanin g of drawin gs an d spe cifications and shall b e entitled to re ject any wo rk or m aterial whic h in hi s judg ement is not in full accordan ce herewith.

1.4 The extent of supply under the co ntract includes all items shown in the dra wings, notwithstanding the fact t hat su ch ite ms may have been omitted from the specification or schedules. Similarly, the extent of sup ply also incl udes all items mentioned in the specification and /or sche dules, notwithstan ding th e fact that such item s may have been omitted in th e drawi ng. Similarly, the e xtent of supp ly also includ es all terms requi red for completion of the system and not withstanding that they may have been omitted in drawings / specifications or schedules.

1.5 The ge neral term a nd con ditions, in structions to tend erers and oth er attachme nt referred to elsewhere are made part of the tender spe cification. The equip ment materia ls and wo rks covered by this specifi cation is su bject to co mpliance to all attac hments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.

1.6 While all efforts have b een ma de t o make the spe cification req uirement com plete & unambiguous, it shall be bidde rs' responsibility to ask for mi ssing info rmation, en sure completeness of specifi cation, to bring out any contradi ctory / conflicting requireme nt in different sections of the sp ecification and within a section itself to the notice of BHEL and to seek any clarification on specif ication requirement in the form at enclosed under section-III of the sp ecification**.** In absence of any su ch clarifications, in case of any contradi ctory requirement, the more stri ngent req uirement as per interpretation of Purchase r / Custome r shall prevail and sh all be complied by the bi dder without any comm ercial implicatio n on account of the sam e. Fu rther in case of any missing inform ation in the sp ecification no t brought out by the prosp ective bidde rs as part of pre -bid cl arification, the same shall b e furnished by Purchaser/ Customer as and when brought to their notice either by the bidder or by purcha ser/ custom er th emselves. Howeve r, su ch requi rements sh all be bi nding o n the successful bidder without any commercial & delivery implication.

1.7 The bidder's offer shall not carry any sections like clarification, interpretations and/or assumptions.

1.8 Deviations, if any, should be very clearly brought out clause by clause along with cost of withdrawal in the enclosed schedule (in section – III); otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification. If no cost of withdrawal is given against the deviation, it will be presumed that deviation can be withdrawn without any cost to BHEL/its customer.

1.9 In the event of any conflict between the requirements of two clauses of this specification documents or requirements of different codes and standards specified, Section – IA shall prevail over section – IIA and Section -IB & IC shall prevail over Section-IIB & IIC , however more stringent requirement as per the interpretation of the owner shall apply.

1.10 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.

1.11 For definition of word like Contractor, bidder, supplier, vendor, Customer/ Purchaser / Employer, consultant, please referred relevant clause(s) of GCC.

2.0 SCOPE OF SUPPLY:

Note1:- Bidder to note that the technical specification is prepared considering uni-polar/ bipolar design. So the equipment and mandatory spares as applicable for uni-polar/ bipolar design as per manufacturer standard practice shall be supplied.

A) Scope of Supply by Bidder:-

2.1 Two streams of electrolysers working in parallel (each of capacity minimum 6 Nm3/hr.).

2.2 Three (3) numbers of hydrogen gas compressors and drives (each of minimum 7.5 Nm3/hr.). Each compressor set shall be capable of compressing hydrogen gas from suction pressure corresponding to that of the low pressure at generation point to the pressure required to fill the hydrogen cylinders i.e. 150 Kg/cm2 (gauge), with pressure gauge, safety relief valve, temperature gauge etc. along with flame proof electric motor, cell purging system, hydrogen gas buffer tanks.

2.3 One (1) no. Gas Washing Tank per stream or any other alternative device to remove traces of caustic potash entrained with hydrogen gas along with manometers at inlet and outlet, temperature gauge, level switches for controlling the level of DM water in the tank, etc.

2.4 Two (2) numbers Gas holders (one for filling, one for supply to compressor) with capacity each equal to

2.5 One (1) off-line specific gravity measuring instrument for electrolyte.

2.6 One (1) no. on line thermal conductivity analyser.

2.7 Two (2) nos. Hydrogen filling stations with manifold isolating valve, safety valve etc. for both evacuation and simultaneous filling of minimum 4 cylinders (total 8 nos.) shall be provided with hydrogen at a maximum filling pressure of 150 Kg /cm2 (gauge). Each filling manifold shall be provided with a common vacuum pump for evacuation of air from hydrogen cylinder prior to filling.

2.8 Two (2) nos. Nitrogen manifold common for both streams shall be provided. Each nitrogen manifold shall comprise of two 4 nos. for complete purging of the hydrogen gas streams, along with complete scavenging system comprising necessary piping network, all fittings, pressure reducing station etc.

2.9 One (1) no. Electrolyte (caustic solution) Mixing & Storage tank of High Density PVC/HDPE/SS construction.

2.10 Two (2) nos. Electrolyte Transfer Pumps (if applicable) with drive motors. Suitable to pump alkali upto the cells with discharge flexible hose, differential pressure gauge across suction filter, pressure gauge at pump discharge etc., pressure gauge at pump discharge, differential pressure gauge across suction filter etc. complete with all other accessories.

2.11 One number tank of Capacity adequate for 5 days' normal requirement of hydrogen gas generation on continuous basis at rated capacity of total hydrogen generation plant shall be

provided. Further, the tank is to be size d considering 12 hours operation per day. DM water tank shall be fitted with removable drain connections, level transmitters, level indicators etc.

2.12 Bidder to no te that DM water shall b e used in cl osed circuit with chille r u nit for coolin g of equipment. Chiller unit consist of two n os. Air co oled chillers, one number Chiller water storage tank of adequate capacity, two nos. chilled water re circulation pumps complete with drive motors along with strainers and a ll other necessary in struments, i solation valves, pi ping, flange s, pipe fittings etc.

2.13 De-oxy units, coolers, hydroge n gas purification system, filling manifold, pipi ng fitting, valves, complete with required in strumentation and other items as per P&ID for the hyd rogen generation plant enclosed with this technical specification.

2.14 Bidder shall i nclude vacuu m pump a nd high-pre ssure cylinde r te sting ap paratus alo ng with all accessories for testing cylinders.

2.15 Bidder to i nclude the Ve ntilation Requi rement for hazardous a nd non-hazardous a rea i ncluding toilets and M CC in hi s scope for the H2 Plant buil ding a s per t he req uirement spe cified i n the technical specification.

2.16 Bidder shall also include in his scope window Air-conditioners for his control panels etc. Bidder to specify the same in his offer.

2.17 Bidder shall inclu de in his scope ne cessary support/platform /ladde r/hanger /ancho r bolts a s required for satisfa ctory erection / commissioni ng & operation of plant shall be provided by bidder.

2.18 Bidder shall i nclude in his sco pe all hydrog en ge neration plant pi pes a nd con duit sup port. All drains shall be terminated at point in hydrogen generation plant building.

2.19 Bidder shall also provide connection, isolation device, manifold, piping etc. for N2 gas connection to cell system for purging.

2.20 Bidder to note that N2 gas required for purging the system during commissioning/Demonstration test/trial operation etc. till handing over the plant to shall be arranged by bidder.

2.21 Bidder shall include in his scope one lot of mandatory spares as per list enclosed as Annexure-VI of technical specification.

2.22 Bidder shall also o btain t he ne cessary clea rances etc. from Go vt. Agencies for the Hyd rogen Generation p lant. Hydrog en gen eration and sto rage system shall comply with all applicab le federal state laws, and local ordinances.

2.23 Bidder shall guarantee t hat the eq uipment o ffered sh all meet the rating and p erformance requirements for successful running of hydrogen Generation plant.

2.24 Start-up & Commissioning spares.

2.25 Counter flan ges, blan k flange s, isolati on valves at all the terminal points a s required as per system requirements.

2.26 All speci al tools ne cessary for prope r maint enance or adju stment of the equipment pa cked in permanent box.

2.27 All nece ssary stru ctural st eel for pipe supporting structure, platfo rms, walkways / path ways and access stairs, mechanical plant and eq uipment, mechanical servi ces an d pipe work a ssociated with Hydrogen Generation Plant.

2.28 Permanent la dder (not run gs) f or a pproaching the top of tanks, valves for All steel inserts wit h lugs, plates, bolts, nuts, sleeves, edge angles and all other e mbedding co mponents etc. as required to g rout in civil works an d to sup port/hold the equi pment bein g su pplied under this specification for opening/maintenance purpose.

2.29 All auxiliary steel st ructures (U-clam ps, nuts, bolts, chan nels etc.) for fixing the pipe on the pedestal or trestles.

2.30 Wrapping, coating and protection of all the buried pipe shall be as per IS 10221 or AWWA C 203.

2.31 Finish paint for touch-up painting of equipment after erection at site in sealed containers.

2.32 Set of special tools and tackles if required for maintenance and erection of equipment supplied.

2.33 All insert pl ates, pud dle pipes, nuts and b olts, counter fla nges, gro uting material wherever applicable shall be in the scope of bidder.

2.34 Embedment plates with lugs shall also be provided by bidder as per system requirement.

2.35 Monitoring g adgets, instru ments a nd e quipment req uired fo r com missioning & maintena nce (till PG test and plant handover).

2.36 Instrument hook up material shall be in bidder's scope.

3.0 SCOPE OF SERVICE:

The bidder's scope also includes the following services:

i) Design and engineering of entire hydrogen generation Plant
ii) Erection and commissioning, unloading, storage and handling at site.
iii) Arrangement of all instruments and lab facilities to carry our trail run, commissioning and PG test.
iv) Minor Civil work in cluding chippin g of foundat ion, grouting b elow base plate f or all stru ctures, equipment, g routing of an chor bolt s whereve r th ese are not pl aced in the foundation d uring casting of foundatio n itse lf etc. To th e extent possible, vendo r shall en sure to supply all foundation bolts timely so as to facilitate placement of these bolts while ca sting the foundation. Wrapping, coating and protection of all the buried pipe shall be as per IS 10221.
v) In site transportation.
vi) Pre- Commi ssioning wo rk such as flu shing, hydraulic testing etc. Necessary consumabl es and instrumentation as req uired for inspe ction and test ing at works as well as at site includi ng pre-commissioning activities shall be arranged by the successful bidder at their own cost.
vii) Monitoring gadgets, instruments and equipment required for maintenance (till PG test and plant handed over).
viii) All personal required during commissioning and PG test.
ix) Complete grouting for equipment including grouting material, fixing and any concreting inside the plant.
x) Trail run for requisite period.
xi) Perform ance testing.
xii) Painting as per enclosed painting schedule. However, any vari ation in the painting sch edule as finally approv ed by cu stomer shall be taken ca re by the bidde r without any comme rcial and delivery implication. Colo ur codin g scheme shall be intimate d to vendo r durin g det ailed engineering.
xiii) Final touch up painting at site.
xiv) Obtaining CCE approval.
xv) Preparation of civil assignment drawings i.e. pedestals details; insert plates / embedment's plates required for suppo rting pipes and e quipment etc. and review of ci vil drawing p repared by BHEL based on civil assignment drawing of bidder. In case any modification is required in the civil work already done based on civil inputs given by vendor, rework shall be done at the co st and ri sk of the vendor.

4.0 TERMINAL POINTS:

TP1: - DM water sh all be use d as cooli ng water and shall be terminated at a distan ce of 1 0m from the hydrogen plant buil ding at am bient temperature and pressure of 1 kg/cm2 (min) and the same may be used as coolin g water. Bidd er to incl ude in his sco pe al l the equipm ent and a ccessories required for close d loop co oling with chil ler unit for co oling of equip ment. Chiller unit consist of two nos. Air cooled chillers, one number Chiller water storage tank of adequate capacity, two nos. chilled water re circulation pumps complete with drive m otors along with strainers and all oth er necessary instruments, isolation valves, piping, flanges, pipe fittings etc.

TP2, Feed water (Refer annexure – VIII, section-IA, for the feed water analysis):- Bidder to note that the DM quality feed water shall be terminated at one point (10 meter from hydrogen generation plant building) for hydrogen generation. Further distribution of DM feed water shall be in bidder's scope.

TP3: - Bidde r to note th at both Instru ment and service air shall not be p rovided for hydrogen generation. Bidder to in clude in hi s scop e all the equipm ent a nd acce ssories requi red f or both instrument a nd service Air. Furthe r di stribution of I nstrument a nd se rvice air shall b e in bidder's scope.

TP4, Drains: - All drains shall be terminated at one point by bidder.

5.0 SCOPE OF SUPPLY (ELECTRICAL)

Complete el ectrical a s p er spe cification / deta ils indicate d in Section IB (Spe cific T echnical Requirement Electrical) and IIB (General Technical Requirement Electrical).

6.0 SCOPE OF SUPPLY (C&I)

Complete C&I as per specification / details indicated in Section IC (Specific Technical Requirement C&I) and IIC (General Technical Requirement C&I).

7.0 SCOPE OF SUPPLY (CIVIL)

7.1 Total Civil construction work at site is in BHEL's Scope of work, however complete grouting for equipment, pumps, blowers etc. fixing of equipment, pumps, blowers etc. as required shall be in bidder's scope.

7.2 Pedestals for pipe supports, however, auxiliary structure, supports components for piping is in bidder's scope.

7.3 Also detailed Civil Input drawing shall be provided by bidder. Successful bidder shall furnish civil assignment drawings. The corresponding CIVIL drawing prepared by BHEL / CIVIL agency, based on civil assignment drawing of bidder will be furnished to the successful bidder for concurrence

8.0 BIDDER TO FURNISH FOLLOWING DOCUMENT/INFORMATION ALONG WITH THE BID.

8.1 Pre-bid if any in enclosed pre-bid schedule.
8.2 Deviation schedule duly fill for deviation along with cost of withdrawal, if any.
8.3 Schedule of Declaration.
8.4 Guarantee Power Consumption in open as a part of tender specification.
8.5 Guaranteed Performance Data.

9.0 EXCLUSIONS

a) DM, Service water and potable water up to the terminal point.
b) All civil construction Works at site.

10.0 QP AND SUB VENDOR APPROVAL

Bidder to note the QP requirement shall be in line with the Annexure -I of technical specification. However, detailed QP, inspection checklist, certificate of conformance etc. for each sub-vendor shall be decided during detailed engineering. All inspection & testing etc. shall be carried out accordingly. Any changes/additional tests insisted upon by Owner during detailed engineering shall be accepted by bidder without any commercial implication to BHEL/Owner.

11.0 SUB VENDOR

The sub vendor list (Annexure- II) enclosed is indicative only and is subject to approval / acceptance by customer. Bidder to propose his sub vendor list with back up documents (experience list, end user performance certificate as applicable) etc. The same shall subject to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.

12.0 DESIGN/CONSTRUCTION

- The P&IDs (Dwg.No.-PE-DG-434-168-A001) is enclosed herein in this section for bidder's compliance.
- The material of construction specified in specification are minimum requirements and material of construction for other components not specified shall be similarly selected by the bidder for intended duty which shall be subjects to customer approval during detailed engineering without any delivery and price implication to BHEL.

- The technical specification requirement for items which are not included shall be subject to customer/BHEL approval during detailed engineering stage. Vendor will submit all the backup documents for provenances of the technical details selected.

13.0 DRAWING/DOCUMENTS REQUIREMENT

For the Drawings/Documents submission schedule, please refer ANNEXURE-VII.
For the Drawings/ Documents distribution Procedure, please refer ANNEXURE-IV. The bidder has to submit the revised drawing/document along with the compliance sheet indicating enumerate reply to all BHEL and customer comments or observations. Without compliance sheet the submission of the drawings/documents will not be considered and the delay on this account will be solely on bidder's side only. Bidder to comply with the observations of the BHEL and CUSTOMER without price & delivery implication.

14.0 SPARES

All the spares for the equipment under the contract provided by the vendor will strictly conform to the specifications and documents and will be identical to the corresponding main equipment/components supplied under the contract.

A) MANDATORY SPARES

a. The list of mandatory spares which is to be considered by bidder in their scope are indicated in Annexure VI.
b. All mandatory spares shall be delivered at site at least two months before scheduled date of initial operation of the first unit. However, spares shall not be dispatched before dispatch of corresponding main equipment.
c. Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until and unless specified otherwise.
d. Inspection of mandatory spares shall be in line with the approved quality plans for the respective items/equipment. The inspection categorization of mandatory spares shall also be in line with the approved Categorization plan for the respective items/equipment.

B) START-UP & COMMISSIONING SPARES

Start-up and commissioning spares are those spares which are required during the start-up and commissioning of the equipment/system. All spares used till the plant is handed over to the BHEL/Customer shall come under this category. The Bidder shall provide for an adequate stock of such start up and commissioning spares to be brought by him to the site for the plant erection and commissioning. They must be available at site before the equipment are energized. The unused spares, if any, should be removed from there only after the issue of Taking Over certificate. All start up spares which remain unused at the time shall remain the property of the Bidder.

Notes: -

a. The Bidder shall indicate the service expectancy period for the spares under normal operating conditions before replacement is necessary.

b. All spares supplied under this contract shall be strictly interchangeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desecrator packs as necessary.

c. All the spares (mandatory) shall be manufactured along with the main equipment components as a continuous operation as per same specification and quality plan.

d. Each spa res part shall b e clea rly marke d or lab elled on the o utside of the packing wit h its description. When more than one spares part is packed in a single case, a general description of the content shall be shown on the outside of su ch case a nd a de tailed list en closed. All cases, containers a nd other p ackages mu st be suita bly marked a nd numbe red for the purp oses o f identification.

e. All case s, co ntainers o r o ther pa ckages ar e to be open ed for such exa mination as may be considered necessary by BHEL / Customer.

f. The Bidde r will provid e the BHEL/Cu stomer with all the addre sses a nd pa rticulars of hi s su b suppliers while placing the order on vendors for items/components/equipment covered under the contract and will further ensure with his vendors that the BHEL/Customer, if so desires, will have the right to pl ace order for spares directly on t hem on mutually ag reed terms based on offers of such vendors.

g. The Bidder shall warrant that all spares supplied will be new and in accordance with the contract Documents and will be free from defects in design, material and workmanship.

h. The bidd er to provide da tasheets/assembly dr awings of the manufactu rer/ any other rele vant document showing Bill of Material(s), Make, Mod el Number, Part Number etc. through which the mandatory spares to be supplied can be uniquely identified.

15.0 POWER LOADING CRITERIA: -

Note 1: - Bi dder shall submit format f or guarantee power consumption i n the form at attached in annexure-XII, section-IA, duly filled-in all respects along with technical offer.

16.0 ADDITIONAL REQUIREMENT

- Bidder to submit BBU du ring d etailed engineering after ap proval of Basi c do cuments. BB U shall be equ al to BOQ for the packag e and there shall be no price and delivery implicatio n is applicable to BHEL / customer for the same. None of the items supplied for the project as non-billable. Final Electrical Load list will be submi tted by the successful bidder as per agreed drawing/ doc submission schedule. Th ereafter any cha nge in th e electri cal lo ad list shall be entertained only subject to its feasibility, and BH EL reserves the right to debit the vendo r cost of any chan ges ne cessitated in the switch ge ar /MCC on account of changed loa ds. Incomplete BBU shall not be review by BHEL.

- Any statutory requirement / clearan ce required for th e package from governm ent / local bo dy shall be in bidder's scope.
- The vend or of their cont ractual obli gations of co mpleting the work a s p er sp ecification requirement. Any deviation from speci fied requi rement shall be repo rted by the vendor in writing and require written approval shall be taken from BHEL. Unless any change in specified requirement has b een b rought out by the vendor during detail engineering i n writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.

- KKS numberi ng if requi red, as per BHEL/Cus tomer requirement shall be provided by the Bidder during detailed engineering stage without any commercial/delivery implication to BHEL.
- Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessa ry to complet e the wo rks for trou ble free and efficie nt operation of the plant sha ll be deemed to be included within t he scop e of this spe cification. The bidde r without any extra charge shall provide the same.
- Buried piping shall be protected as under (as per IS-10221).
- Surface cleaning by wire brush, power tool cleaning etc.
- Apply one coat of coaltar/primer/enamel.
- Apply one la yer of tape compri sing of coalta r. Application of tap e shall conform to AWWA C-

203/IS 10221 (appendix-B) with Minimum thickness of tape as 4MM +10%

- Final Electrical Load list will be submitted by the successful bidder as per agreed drawing/ doc submission schedule. Thereafter any change in the electrical load list shall be entertained only subject to its feasibility, and BHEL reserves the right to debit the vendo r cost of any changes necessitated in the switch gear /MCC on account of changed loads.
- In case vend or su bmits revised d rawing afte r app roval of the correspon ding drawi ng, an y delay in approval of revi sed drawing shall be to ve ndor's account and shall not be u sed as a reason for extension in contract completion.
- Bidders shall make Site visit in order to familiari ze themselves with existing condition of site before submitting the bid in order to make their offer complete. During detail engineering also, the successful bidder shall be responsible for the correctness of details w.r.t. existing facility at site. Customer approval on any drawing having details of existing facility shall not be cited by the su ccessful bidd er a valid rea son fo r a ny sh ortcoming i n the work by the m. BHEL shall also not entertain any cost implication for any lack of input data with regard to site during detail engineering.
- Preparation of drawings / document / P&ID's in 3D modelling software and providing soft copy of same to BHEL.
- Wherever local instru ments for mea surement of Flow, Pressure, Level is indi cated in the P&ID, Bidder to provide Di aphragm seal typ e instru ment for Chemi cal (all type an d co ncentration), corrosive, viscous fluids application.
- All the vertical pumps shall be considered as self-lubricating type unless specifically mentioned.
- All piping, valves, fittings to be selected by bidder of minimum PN 10 or 150# class rating.

17.0 INSTRUCTIONS TO BIDDER

a) The cont ractor shall be resp onsible for provid ing al l material, equipment & service s, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered unde r this spe cification, irrespe ctive of whethe r it has been specifically listed he rein o r not. Omissi on of sp ecific refe rence t o any com ponent / acce ssory necessary for proper performance of the equipment shall not relieve them of th e responsibility of providing su ch facilitie s to complete the supply, erection an d commi ssioning of Com plete Pretreatment Plant.

b) It is not the intent to specify herein al l t he details of design an d manufactu re. Howeve r, the equipment shall conform in all resp ects to high stand ards of desi gn, e ngineering a nd workmanship and shall be capable of p erforming the requi red duties in a m anner acceptable to purchaser wh o will interpre t the meanin g of dra wings and spe cifications and shall be entitled to reject any work or material which in his judgment is not in full accordance herewith.

c) The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of su pply also i ncludes all it ems m entioned in the specification a nd /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.

d) The g eneral terms and condition s, in structions to tende rer and other attach ment referre d to elsewhere are made part of the tender specification. The equipment materials and works covered by this spe cification are subject to comp liance to all attachments referred to in th e specification. The bidder shall be responsible for and governed by all requirements stipulated herein.

e) While all efforts have been mad e to make the spe cification requi rement complet e & unambiguous, it shall b e bidd ers' resp onsibility to ask for missing inf ormation, en sure completeness of specifi cation, to bring out any contradictory / conflicting requi rement in different sections of the spe cification an d withi n a sectio n itself to the n otice of B HEL and to seek an y clarification on specification requirement in the format enclosed under Vol- III of the s pecification **within 10 days of receipt of tender documents**. In absen ce of any su ch clarifications, in case of any contradicto ry req uirement, the more stri ngent requi rement as per interpretatio n of BHEL/Customer shall p revail and shall be compl ied by the b idder without any comm ercial

implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by BHEL/ Customer as and when brought to their notice either by the bidder or by BHEL/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

f) The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.

g) Deviations, if any, should be very clearly brought out clause by clause along with cost of withdrawal in the enclosed schedule (in Vol – III); otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification. If no cost of withdrawal is given against the deviation, it will be presumed that deviation can be withdrawn without any cost to BHEL/its customer.

h) In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.

i) Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder/vendor and Customer/Purchaser/Employer will mean BHEL and/or Customer.

j) The equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and dispatch release issued by BHEL/Customer as per approved QAP.

k) BHEL's/Customer's representative shall be given full access to the shop in which the equipment are being manufactured or tested and all test records shall be made available to him.

l) Pre-bid meeting shall be held before bid submission. Bidder to ask all their queries in pre-bid meeting.

ANNEXURES

ANNEXURE-I: QUALITY PLAN

HYDROGEN GENERATION PLANT

HYDROGEN GENERATION PLANT-TESTS

Items / Components \ Tests/Check	Material Test	WPS/PQR/Welder Qualification	DPT/MPI	Ultrasonic test	RT	Pneumatic test	Hydraulic / Water Fill tests	Assembly / fit up	Dimension	Functional/ operational tests	Performance tests	Other tests	Remarks
H2 PLANT													
A.COMPRESSOR								Y		Y	Y (#)		
1) Casing	Y^{3}												
2) Crank shaft/connecting rod	Y^{3}		Y	Y					Y				
3) Piston/Diaphragm			Y^{3}							Y			
B. DRYING PLANT							Y						
1.)Raw material identification	Y^{3}		Y^{1}		Y^{2}								
C. HYDROGEN GENERATOR							Y			Y	Y		
D. CELL MODULE							Y			Y	Y		
E. GAS HOLDER	Y^{3}						Y						

1. Fillet welds/nozzles welds and knuckle portion of dished ends and all butt welds.

2. 100% butt welds and 100% for Tee joints and dished ends welds.

3. One per heat /HT batch.

Notes.

1. Quantum of checks shall be 100% unless otherwise specified.

- Capacity and discharge pressure of Hydrogen gas compressor at its rated duty points with its job (own) motor shall be demonstrated and proved at shop. Vibration and noise levels of Hydrogen gas compressors shall also be demonstrated at shop.

MOTOR

TESTS/CHECKS / TEMS/COMPONENTS	Visual	Dimensional	Make/Type/Rating /General Physical Inspection	Mech/Chem. Properties	NDT /DP/MPI/UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y	Y				Y
Shaft	Y	Y	Y	Y	Y	Y			Y
Magnetic Material	Y	Y	Y	Y			Y		
Rotor Copper/Aluminium	Y	Y	Y	Y			Y		Y
Stator copper	Y	Y	Y	Y			Y		Y
SC Ring	Y	Y	Y	Y	Y		Y	Y	Y
Insulating Material	Y		Y	Y			Y		
Tubes, for Cooler	Y	Y	Y	Y	Y				Y
Sleeve Bearing	Y	Y	Y	Y	Y				Y
Stator/Rotor, Exciter Coils	Y	Y	Y				Y	Y	
Castings, stator frame, terminal box and bearing housing etc.	Y	Y	Y	Y	Y			Y	
Fabrication & machining of stator, rotor, terminal box	Y	Y			Y			Y	Y
Wound stator	Y	Y					Y	Y	
Wound Exciter	Y	Y					Y	Y	
Rotor complete	Y	Y					Y		
Exciter, Stator, Rotor, Terminal Box assembly	Y	Y					Y		
Accessories, RTD, BTD,CT, Space heater, antifriction bearing, gaskets etc.	Y	Y	Y						
Complete Motor	Y	Y	Y						

Note:
1. This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, No QP for LT motor upto 50KW.
2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard
3. Makes of major bought out items for HT motors will be subject to NTPC approval.

Y1 = for HT Motor / Machines only.

MOTOR

TESTS/CHECKS / ITEMS/ COMPONENTS	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	Routine & Acceptance tests as per IS-325/IS-4722 /IS- 9283/IS 2148/IEC60034\IEC 60079-I	vibration	Over speed	Tan delta, shaft voltage & polarization index test	Paint shade, thickness & adhesion
Plates for stator frame, end shield, spider etc.										
Shaft										
Magnetic Material	Y		Y							
Rotor Copper/Aluminium										
Stator copper			Y							
SC Ring										
Insulating Material			Y							
Tubes for Cooler		Y								
Sleeve Bearing		Y								
Stator/Rotor, Exciter Coils										
Castings, stator frame, terminal box and bearing housing etc.										
Fabrication & machining of stator, rotor, terminal box										
Wound stator										
Wound Exciter										
Rotor complete				Y	Y					
Exciter, Stator, Rotor, Terminal Box assembly										
Accessories, RTD, BTD,CT, , Space heater, antifriction bearing, gaskets etc.										
Complete Motor						Y	Y	Y	Y1	Y

Note: 1. This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, No QP for LT motor upto 50KW.

2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard

3. Makes of major bought out items for HT motors will be subject to NTPC approval.

Y1 = for HT Motor / Machines only.

		QUALITY PLAN	CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ VENDOR :			QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01			SPECIFICATION TITLE			
		SHEET 1 OF 2	SYSTEM			ITEM AC ELECT. MOTORS BELOW 55KW (LV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	MANUF'S SPEC	MANUF'S SPEC	-DO-	2	-	-	
		2.DIMENSIONS	MA	-DO-	-DO-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	-DO-	2	-	-	
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/COLOUR CODE	MA	VISUAL	100%	MFG.SPEC./ RELEVANT IS	MFG.SPEC. RELEVANT IS	-DO-	2	-	-	
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	MANUFR'S SPEC/BHEL SPEC./RELEVANT STANDARD	BHEL SPEC. SAME AS COL.7	LOG BOOK	2	-	-	
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST AS PER BHEL SPEC.	MA	-DO-	100%	IS-325/ BHEL SPEC./ DATA SHEET	SAME AS COL.7	TEST REPORT	2	1		NOTE -1 & NOTE-3
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET & RELEVANT IS	INSPN. REPORT	2	1	-	NOTE -1 & NOTE-3
BHEL			**PARTICULARS**		**BIDDER/VENDOR**							
			NAME									
			SIGNATURE									

	QUALITY PLAN		CUSTOMER :			PROJECT TITLE			SPECIFICATION : NUMBER :			
			BIDDER/ : VENDOR			QUALITY PLAN NUMBER PED-506-00-Q-006, REV-01			SPECIFICATION : TITLE :			
		SHEET 2 OF 2	SYSTEM			ITEM AC ELECT. MOTORS BELOW 55KW (LV)			SECTION			VOLUME III
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	W	V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
		3.NAMEPLATE DETAILS	MA	VISUAL	100%	IS-325 & DATA SHEET	IS-325 & DATA SHEET	INSPN. REPORT	2	1	-	

NOTES:

1 ROUTINE TESTS ON 100% MOTORS SHALL BE DONE BY THE VENDOR. HOWEVER, BHEL SHALL WITNESS ROUTINE TESTS ON RANDOM SAMPLES. THE SAMPLING PLAN SHALL BE MUTUALLY AGREED UPON

2 WHERE EVER CUSTOMER IS INVOLVED IN INSPECTION, (1) SHALL MEAN BHEL AND CUSTOMERS BOTH TOGETHER.

3 FOR EXHAUST/VENTILATION FAN MOTORS OF RATING UPTO 1.5KW , ONLY ROUTINE TEST CERTIFICATES SHALL BE FURNISHED FOR SCRUTINY.

Legends for Inspection agency

1. BHEL/CUSTOMER
2. VENDOR (MOTOR MANUFACTURER)
3. SUB-VENDOR (RAW MATERIAL/COMPONENTS SUPPLIER)

P. PERFORM
W. WITNESS
V. VERIFY

BHEL	**PARTICULARS**	**BIDDER/VENDOR**	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/VENDORS COMPANY SEAL

INSTRUMENTATION CABLE

TESTS / ITEMS	Conductor Resistance ® & (A)	High Voltage ® & (A)	Insulation Resistance ® & (A)	Constructional detail, dimensions (A)	Outer-Sheathe/core marking, end sealing (A)	Thermal Stability (A) +	Visual, Surface finish (A) +	Electrical Parameters ** (A) +	Persulphate Test (A) +	Overall/Coverage/Continuity (A)	Swidesh chimney Test (SS-4241475) (A) ++	FRLS Test * (A) ++	Tensile & Elongation before & after aging (A) ++	Vol. Resistivity. at room & Elevated Temp. (A) ++	Spark test report review ®
1. Instrument cable twisted and shielded															
Conductor(IS-8130)	Y			Y			Y								
Insulation(VDE-207)				Y	Y	Y	Y						Y		Y
Pairing/Twisting				Y	Y		Y								
Shielding				Y			Y			Y					
Drain wire	Y			Y			Y		Y	Y					
Inner Sheath				Y	Y	Y	Y					Y	Y		
Outer Sheath				Y	Y	Y	Y					Y	Y		
Over all cable	Y	Y	Y	Y	Y		Y	Y			Y			Y	
Cable Drums(IS-10418)				Y			Y								

Note : High Temp. cables shall be subjected to tests as per VDE-207(Part-6) Compensating cables shall be checked for Thermal EMF/Endurance test as per IS 8784.

Note : This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating his practice & Procedure along with relevant supporting documents during QP finalization for all item.

Note : ® - Routine Test A - Acceptance Test Y - Test Applicable

Note : Sampling Plan for Acceptance test shall be as per IS 8784 (As applicable)

- * FRLS Tests: Oxygen / Temp Index (ASTM D-2863), Smoke Density Rating (ASTM – D 2843), HCL Emission (IEC-754-1)
- ** Characterisitic Impedence, Attenuation, Mutual Capacitance, Cross Talk (As applicable)

\+ Sample size will be One No. of each size/type per lot.

++ Sample size will be One No. sample for complete lot offered irrespective of size/type.

CONTROL VALVE ACTUATORS AND ACCESSORIES.

TESTS / ITEMS	Make,model,tag (R)	Dimension®	Surface finish®	Heat Treatment®	Material Test Certificates®	IBR Certificates®	Hydraulic Test®	UT/Radiography for >900 lb rating®	MPI/DP®	Pressure Resistance®	Seat leakage®	Timeing Open/Close®	Linearity/Hysterisis®	Functional Test, review for make and TC of accessories®
CONTROL VALVE AND ACTUATOR														
Overall	Y	Y	Y			Y	Y				Y	Y	Y	Y
Body		Y	Y	Y	Y			Y	Y	Y				
Bonnet		Y	Y	Y	Y									
Trim		Y			Y			Y*						
Pneumatic actuator	Y	Y								Y				

R- Routine Test A - Acceptance Test Y - Test Applicable

Y* - **UT on spindle dia >= 40 mm.**

Note : **1) Detailed procedure of Environmental Stress Screening test shall be as per Quality Assurance Programme General Technical Conditions**

2) This is an indicative list of tests/checks. The manufacture is to furnish a detailed Quality Plan indicating his practice & Procedure along with relevant supporting documents during QP finalisation for all item.

ELECTRICAL ACTUATOR WITH INTEGRAL STARTER

Test/Attributes / Characteristics / ITEM/ COPONENT/ SUB SYSTEM ASSEMBLY/ TESTING	RPM ®	No Load Current ®	IR & HV Test®	Mounting Dimension®	All routine Test as per Standard & Specification®	Correct Phase Sequence®	Operation & Setting of limit Switch/Torque Switch®	Stall Torque/Current (A)	Hand Wheel operation/ Auto de clutch function (A)	Function of Aux. like Potentiometer, space heater, position indicator ®	EPT output ®	Grease leakage ®	Local/ Remote (Open-Stop-Close) Operation® Safety check (Single phasing, Phase correction, Tripping etc.) (A)
ELECTRICAL ACTUATOR WITH INTEGRAL STARTER(IS_9334)													
Motor	Y	Y	Y	Y	Y								
Final Testing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: 1) Detailed procedure of Environmental Stress Screening test shall be as per Quality Assurance Programme in General Technical Conditions

2) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the practices and procedure adopted along with relevant supporting documents.

® - Routine Test (A) - Acceptance Test Y - Test applicable

POWER SUPPLY FOR C&I SYSTEMS (UPS/BATTERY/BATTERY CHARGER/ACDB/DCDB)

TESTS / ITEMS	Visual/dimension/rating/ Paint Adhesion/ Thickness (R)	General arrangement/BOM/make of components /Mimic ®	Efficiency ,regulation(R)	Input voltage variation (A)	Out put voltage and frequency adj.range(A)	Premilinary light load test(R)	Load transfer retransfer test (R) *	AC input faliure and return test (R)	Parralel operation and current divison(R)	Relative harmonic content(R)	Restart with PRI A.C and battery (separately)(R)	System transfer and retransfer (R)*	Asynchronous transfer(R)	Ripple content(R)	Load limiter operation (R)	IR/HV(R)	Tests as per standard &specification (R)&(A)
UPS/CONVERTER (IEC-146 PT-4)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VOLTAGE STABILISER	Y	Y	Y	Y	Y					Y		Y				Y	
LEAD ACID BATTERY(TUBLAR)-IS-1651																	Y
LEAD ACID BATTERY (PLANTE)-IS-1652																	Y
NICKEL CADMIUM BATTERY(IS-10918/IEC-623)																	Y
SMF BATTERY																	Y
ACDB/DCDB	Y	Y														Y	Y
BATTERY CHARGER	Y	Y	Y	Y	Y				Y					Y	Y	Y	Y

R-Routine Test A- Acceptance Test Y – Test applicable

* Transfer time and Over shoot /under shoot during load & system transfer shall be recorded .

Note: 1) Detailed procedure of Environmental Stress Screening test shall be as per Quality Assurance Programme in General Technical Conditions

2) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted alongwith relevant supporting documents.

PROGRAMMABLE LOGIC CONTRLLER

TESTS / ITEMS	Visual ®	GA, BOM ,Lay Out of components ®	Dimensions ®	Paint Shade/ Thickness/Adhesion ®	Alignment of Section ®	Component Rating/ Make / Type ®	Wiring ®	IR & HV ®	Review of TC for instruments/ Devices/ Recorders, Indicators/ Mosaic Items/ Transducers ®	Accessibility of TBS/ Devices ®	Illumination ®	Functional Check for Control Element , Annunciation ®	Mimic ®	Test as per IEC 1131 ® *	Test as per Std ® & (A)
1. PLC Panel	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y			Y	Y
2. Control Desk With PLC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		

Note: **1) Detailed procedure of Environmental Stress Screening test shall be as per Quality Assurance Programme in General Technical Conditions**

2) This is an indicative list of test/ checks. The manufacturer is to furnish a detailed quality plan indicating the Practice and Procedure alongwith relevant supporting documents.

*Applicable for PLC Y - Test Applicable , ® - Routine Test (A) - Acceptance Test

Process Connection & Piping

ITEMS \ TESTS	Visual ®	GA, BOM, Layout of component & construction feature®	Dimension ®	Paint Shade/thickness ®	Flattening,flaring,hydrotest,hardnes s check as per ASTM standard (A)	Component Ratings ®	Wiring ®	Make, Model, Type, Rating®	IR & HV ®	Review of TC for instrument/devices (R)	Accessability of TBs/Devices ®	Illumination,grounding ®	Tubing ®	Leak/Hydro test(A)	Chemical/physical properties of material (A)	Proof pressure test,Dismantling & reassembly test,Hydrulic impulse and vibration test (R)	Tests as per standards & specification
Local Instrument enclosure	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y			Y
Local instruments racks	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y			
Junction Box	Y	Y	Y	Y*		Y		Y	Y								
Gauge Board	Y	Y	Y	Y		Y		Y		Y			Y	Y			
Impulse pipes and tubes	Y		Y		Y			Y							Y		
Socket weld fittings ANSI B-16.11	Y		Y					Y							Y		Y
Compression fittings	Y		Y					Y						Y	Y	Y	
Instrument valves & Valve manifolds	Y		Y					Y						Y	Y		
Copper tubings ASTM B75	Y							Y									Y

*-applicable for painted junction boxes.

Note: R-Routine Test A- Acceptance Test Y – Test applicable

Note: This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted alongwith relevant supporting documents.

CONTROL DESK, LVS PANEL, PLC PANEL, SMOKE DETECTOR, FIRE ALARM & CONTROL SYSTEM

ITEMS \ TESTS	Visual ®	GA, BOM ,Lay Out of components ®	Dimensions ®	Paint Shade/Thickness/Adhesion ®	Alignment of Section ®	Component Rating/ Make / Type ®	Wiring ®	IR & HV ®	Review of TC for instruments/ Devices/ Recorders, Indicators/ osaic Items/ Transducers ®	Accessibility of TBS/ Devices ®	Illumination ®	Functional Check for Control Element ,	Mimic ®	Test as per IEC 1131 ® *	Test as per Std ® & (A)
1. Control Desk	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
2. LVS Panel	Y	Y	Y	Y	Y	Y	Y	Y	Y						Y
3. Annunciation, Control, PLC Panel	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y			Y	Y
4.Smoke Detectors (UL-268,EN-54 PT-7), Heat Detectors(UL-521/EN 54 PT-5) Annunciation/ Control Panel (UL -864, EN-54, PT-2)															Y

Note: 1) Detailed procedure of Environmental Stress Screening test shall be as per Quality Assurance Programme in General Technical Conditions

2) This is an indicative list of test/ checks. The manufacturer is to furnish a detailed quality plan indicating the Practice and Procedure alongwith relevant supporting documents.

- *Applicable for PLC
- Y - Test Applicable , ® - Routine Test (A) - Acceptance Test

PEM :: C&I

STANDARD QUALITY PLAN FOR PROGRAMMABLE LOGIC CONTROLLER

QUALITY PLAN NO.: **PE-QP-999-145-I036___**
VOLUME IIB
SECTION D
REV. NO. 01 DATE: 24.08.2007
SHEET 1 OF 8

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
1.0	**Materials /Components**											
1.1	Panels & Control Desks	Physical Inspection for Dimensions, Painting, Cutouts, Lifting / Locking Arrangements, Components, Drawing Pocket, Mounting accessories, Plinth & AV Pads, Cable Gland Plates, Hardwares, Hinges, Louvers & Filters, Fans & Panel Lamps	MA	Visua l	100%	Contract specifications, Approved GA Drawings, BOQ	As per ref documents. No physical damage.	BHEL Quality Inspection Report.	3/2 2		1	
1.2	Power Supply/Packs, Battery & Battery charger, Transformer, UPS.	Physical Inspection Physical Damages Dimensions Mounting Accessories	MA	Visua l	100%	Contract specifications, BOQ.	As per reference documents, Test Report	BHEL Quality Inspection Report.	3/2 2		1	
1.3	Indicating Lamp, Annunciator, Meters, Transducers, Signal Converters, Instruments, Single Loop Controllers	Physical Verification Physical Damages Dimensions Accessories	MA	Visua l	100%	Contract specifications, BOQ.	As per ref documents No physical damage. Test/ Calibration report.	BHEL Quality Inspection Report	3/2 2		1	
1.4	PLC processors, I/O modules, Power Supply modules, Communication modules, Mounting Racks, Ethernet	Physical Inspection • Identification Labels • Physical Damages • Quantity • Spare Capacity	MA	Visua l	100%	Product Catalogue, Data sheets, Approved Configuration diagram, BOQ	As per ref documents. Test Certificates	BHEL Quality Inspection Report.	3/2 2		1	

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.
1 - BHEL 2 - Vendor 3 - Sub-vendor

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STANDARD QUALITY PLAN
FOR
PROGRAMMABLE LOGIC CONTROLLER

QUALITY PLAN NO.: **PE-QP-999-145-I036___**
VOLUME IIB
SECTION D
REV. NO. 01 DATE: 24.08.2007
SHEET 2 OF 8

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
1.5	CPU, Monitor, Keyboard, Mouse, CD Drives, Printers, OS, System Software, Engineering software in the form of Licensed CD.	Physical Inspection Identification Labels, Tech. Specification Physical Damages Accessories Installation arrangements for Computers & Printers	MA	Visual	100%	Contract specifications, Product Catalogue, Approved GA / Configuration drawing, BOQ.	As per reference documents.	BHEL Quality Inspection Report.	3/2 2		1	

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3 - Sub-vendor

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STANDARD QUALITY PLAN FOR PROGRAMMABLE LOGIC CONTROLLER

QUALITY PLAN NO.: **PE-QP-999-145-I036___**
VOLUME IIB
SECTION D
REV. NO. 01 DATE: 24.08.2007
SHEET 3 OF 8

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
2.0	**Assembly**											
2.1	Functional Test for HMI/OWS devices such as Monitors, Keyboards, Mouse, Printers etc.	Operation	MA	Functional	100%	Approved Configuration Diagram & BOQ and FAT	Correct Operation of interconnected Devices of HMI system.	BHEL Quality Inspection Report.	2 1		1	
2.2	Hardware Functional Verification.	Physical arrangement, Wiring check & labeling, Continuity Checking, IR & HV test	MA	Visual/ Electrical	100%	Approved GA Drawing, Panel Wiring Diagram, IR & HV as per relevant International standard	Test Certification	BHEL Quality Inspection Report.	2 2		1	
2.3	Powering Up	Healthiness of all the modules/equipment, associated with Powering of PLC system	MA	Visual /Electrical	100%	Approved power supply scheme	All equipment to be healthy on power ON	BHEL Quality Inspection Report.	2 1		1	
2.4	Burn in test for PLC modules	Healthiness of PLC modules on Continuous Energisation, Temperature maintenance	MA	Visual/ Electrical	100% F	AT Procedure	Test certification as per FAT	BHEL Quality Inspection Report.	2 2		1	

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STANDARD QUALITY PLAN FOR PROGRAMMABLE LOGIC CONTROLLER

QUALITY PLAN NO.: **PE-QP-999-145-I036___**
VOLUME IIB
SECTION D
REV. NO. 01 DATE: 24.08.2007
SHEET 4 OF 8

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
3.0	**Factory Acceptance Test (FAT)**											
3.1	Input Output Functional Verification	I/O configuration, I/O operation	MA	Visual/ Eletrical	100%	FAT Procedure	AS per FAT	BHEL Quality Inspection Report.	2 1		1	
3.2	Processor Verification	Processor configuration, Powering up, standby operation (as applicable) and Loading	MA	Visual	100%	FAT Procedure	AS per FAT	BHEL Quality Inspection Report.	2 1		1	
3.3	Power Supply Module Verification	Redundancy Operation	MA	Electrical	100%	FAT Procedure	AS per FAT	BHEL Quality Inspection Report.	2 1		1	
3.4	Communication System Verification	Redundancy operation of Communication System, Measurement of Response Time, Communication with third party system	MA	Electrical	100%	FAT Procedure	AS per FAT	BHEL Quality Inspection Report.	2 1		1	
3.5	Diagnostic Verification	Self Diagnostic features of PLC system	MA	Visual	100%	FAT Procedure	AS per FAT	BHEL Quality Inspection Report.	2 1		1	
3.6	Control Panel/Desk Verification	Operation of PLC driven annunciation system, Mosaic, Push buttons & selector switches, Indicating lamps	MA	Visual	100%	FAT Procedure	AS per FAT	BHEL Quality Inspection Report.	2 1		1	
3.7	Software Verification	(i) Control Logics (ii) Engineering Features (iii) HMI Features	MA	Visual	100%	FAT Procedure	AS per FAT	BHEL Quality Inspection Report.	2 1		1	

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FACTORY ACCEPTANCE TEST (FAT) PROCEDURE

This document covers procedure to conduct/witness PLC system functional tests in order to demonstrate conformity to purchase specifications and related engineering documents. The test shall be conducted at the system suppliers works. The system supplier shall conduct all functional tests before commencing FAT and test results shall be made available during FAT. Vendor must furnish following relevant drawings, duly approved by BHEL Engineering, for reference during FAT.

a) Technical Specification of PLC.

b) PLC System Configuration

c) General Assembly Drawings.

d) Panel Wiring Diagrams.

e) Bill of Quantity for PLC System.

f) Logic Diagram.

g) HMI Schematics.

h) Input / Output List.

Further the vendor shall furnish applicable product specification, datasheets, catalogues, test-certificates, and internal inspection records to enable FAT. Vendor shall also submit, to the inspecting agency, his standard test procedure, for clauses given below; where vendor's standard practice has been referred.

APPLICABLE TEST PROCEDURE:

1. Input/Output Functional Verification.

Check for correctness of addressing of racks, slots and I/O modules as per applicable PLC configuration diagram. Appropriate signal generators shall be used to simulate Inputs and outputs to check operation and SCAN time. Check online replacement of cards, processors, power supply etc.

2. Processor Verification

PLC Configuration drawing to be referred for ascertaining

i) Redundancy

ii) Type (Hot or Cold)

Both the processors are to be checked for healthiness in case of redundant configuration as per vendor's standard practice. In case of hot redundancy, switchover of control from primary processor to standby processor shall be demonstrated for uninterrupted control and data processing as per vendor's standard practice. Switchover shall be witnessed, by manual power off or resetting the Primary CPU or simulating failure of primary processor. Checking should be by witnessing the lighting up of Processor's LEDs as per manufacturer's product standard.
Vendor shall demonstrate, as per Vendor's standard practice, adequate Loading (Spare Capacity) of Processors, as mentioned in contract specs. This shall be done, by simulating worst load operation of fully integrated PLC system.

3. Power Supply Module Verification

Check if PSM is in redundant mode as per specification. Check the healthiness of power supply from both the modules' lamp indication/measurement. Simulate failure of one PSM and verify that standby PSM has taken over without any interruption.

4. Communication System Verification

Communication system has to be in line with approved PLC Configuration Diagram. Verify that both the communication buses are intact and connected. Communication between PLC processors, I/O rack, OWS etc. is to be checked through simulation of input data. Simulate the bus failure by disconnection of working bus. Check that the communication continues without interruption or loss of data.

Following response times are to be demonstrated as per vendor's standard practice for conformance to contract specifications:

1. Screen update time
2. I/O scan time
3. SOE resolution time
4. Data transfer time with third party system using Communication Protocol as per Contract specification and as per quantum of data as per approved signal exchange list.

5. Diagnostic Verification

Product Catalogue/Literature shall be referred for checking of all diagnostic features. Hardware failure to be simulated by removing an I/O

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6. Control Panel /Desk Verification

i) PLC driven annunc iation system should be checked by alar m signal simulation.

ii) Push Button and sele ctor switch operation should be checked by verification of corresponding change of status of Data Base point.

iii) Indicating lamp / MIMIC should be checked by corresponding Data Base point simulation.

7. Software Verification

i). Control Logics:– Software switches, lamps and Analog sources shall be used for simulation of field conditions .Control logics shall be checked for its correct functionality as per approved logic schemes

ii). Engineering features:-
a) Online changing of parameters, set points.
b) Online modification in Control Logic Diagrams.
c) Online configuration of Graphics, Trends, Logs, HSR.

iii). HMI features:-
Check for configuration & ope ration of Graphics, Trends, Logs, HSR and Alarms, in the for m of Displays and Printouts, by simulation of Inputs as per approved documents.

8. Burn in Elevated Temperature test

Electronic equipment s shall be subjected to Burn in elevated temperature test as per the procedure detailed below:

a) (i) PLC modules are kept at 50 Deg c under continuous energized condition for 48 hours.

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ii) 48 hours test period shall be divided into 4 equal time segment of 12 hours duration each. For every 12 hours duration segment, after lapse of first 11 hours 110% of nominal voltage shall be applied to the panel under test for a period of 30 minutes followed by application of 90% of nominal voltage for the next 30 minutes.

b) Assembled Panels with complete wiring shall be kept under continuous energized condition for 120 hours at ambient temperature. Temperature rise in panels should be below 10 Deg C above ambient.

	CHECK LIST FOR PRESSURE / DIFFERENTIAL PRESSURE TRANSMITTER (Mechanical Auxiliary Packages)	SPECIFICATION NO.:
BHEL		VOLUME
		SECTION
		REV. NO. / DATE:
		SHEET 1 OF 1

Data Sheet No.: **PE-CL-999-145-I026-0**

SL NO	TESTS/CHECKS	QUANTM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS	AGENCY M	C	B	REMARKS
1.0	CHECKS FOR VISULA, MODEL TAG NO.	SEE NOTE-1 BELOW	APPROVED TECHINCAL REQUIREMENT/ DATA SHEET	P	W	V	MFR TO CARRY OUT ROUTINE TEST ON 100%. WHEN MATERIAL CORELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED
2.0	PROCESS CONNECTION	-do-		P	W	V	
3.0	ACCURACY	-do-		P	W	V	
4.0	REPEATEABILITY	-do-		P	W	V	
5.0	HYSTERISIS	-do-		P	W	V	
6.0	EFFECT OF TEMP VARIATION ON ACCURACY	-do-		P	W	V	
7.0	SPAN /ZERO ADJUSTMENT	ONE/TYPE		P	W	V	
8.0	EFFECT OF SUPPLY VOLTAGE VARIATION	ONE/TYPE		P	W	V	
9.0	HIGH PRESSURE TEST	SEE NOTE-1 BELOW		P	W	V	
10.0	BURN IN TEST	ONE/TYPE		P	W	V	
11.0	DEGREE OF PROTECTION	ONE/TYPE		P	W	V	

LEGEND:
M: MANUFACTURER/ SUB CONTRACTOR, C: CONTRACTOR/ NOMINATED INSP AGENCY, B: BHEL. P: PERFORM, W: WITNESS, V: VERIFICATION.

NOTE:

1. QUANTUM OF CHECK SHALL BE AS BELOW
   100 % - BY MANUFACTURER
   RANDOM FOR EACH TYPE – BY BHEL & CUSTOMER
2. MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.
3. IN CASE OF IMPORTED ITEMS CONTRACTORS SHALL REVIEW TC's AND NOT INSPECT.

CONTRACTOR TO PROVIDE COMPLIANCE CERTIFICATE FOR TESTS/CHECKS VERIFIED BY CONTRACTOR AND SUBMIT THE SAME ALONGWITH TEST CERTIFICATES TO BE VERIFIED BY BHEL.

	PREPARED BY	CHECKED BY	APPROVED BY
NAME	SACHIN SRIVASTAVA	DILIP JEJURIKAR	ALKA TUTEJA
SIGNATURE	Sachin		atuteja
DATE	30.09.08	30.09.08	30.09.08

BHEL	**CHECK LIST FOR PRESSURE / DIFFERENTIAL PRESSURE SWITCH (Mechanical Auxiliary Packages)**	SPECIFICATION NO.: VOLUME SECTION REV. NO. / DATE: SHEET 2 OF 2

Data Sheet No.: **PE-CL-999-145-I031-0**

SL NO	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS	AGENCY P	W	V	REMARKS
1.0	CHECK FOR		APPROVED TECHINCAL REQUIREMENT/ DATA SHEET/ RELEVANT STANDARD / MANUFACTURER CATALOGUE				MFR TO CARRY OUT ROUTINE TEST ON 100%.
	1.1 MODEL NO/TAG NO	100%		M	C	C	
	1.2 RANGE/SCALE	100%		M	C	C	
	1.3 END CONNECTION	100%		M	C	C	
	1.4 SWITCH CONTACT RATING & NOS	100% M			C	C	
2.0	CALIBRATION						
	2.1 REPEATABILITY	100%		M	C	B	
	2.2 DIFFERENTIAL	100%		M	C	B	
	2.3 SET POINT ADJUSTMENT	100% M			C	B	
3.**0**	OVER PRESSURE & LEAK TEST	100% M			C	C	
4.0	REVIEW OF T.C. FOR MATERIAL OF--						WHEN TC FOR MATERIAL FOR THE PROJECT NOT AVAILABLE , COMPLIANCE CERTIFICATE TO BE PROVIDED BY THE MANUFACTURER.
	5.1 SENSOR	FOR LOT		- -		B	
	5.2 MOVEMENT			-	-	B	
	5.3 HOUSING			-	-	B	
5.0	REVIEW OF T.C. FOR DEGREE OF PROTECTION	TYPE TEST		-	-	B	
6.0	REVIEW OF T.C. FOR MICRO SWITCH	FOR LOT		-	-	B	
7.0	ACCESSORIES AS APPLICABLE	100% M			C	C	

LEGEND:
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NOTE:
CONTRACTOR TO PROVIDE COMPLIANCE CERTIFICATE FOR TESTS/CHECKS VERIFIED BY CONTRACTOR AND SUBMIT THE SAME ALONGWITH TEST CERTIFICATES TO BE VERIFIED BY BHEL.

BHEL	**CHECK LIST FOR PRESSURE / DIFFERENTIAL PRESSURE GAUGE (Mechanical Auxiliary Packages)**	SPECIFICATION NO.: VOLUME SECTION REV. NO. / DATE: SHEET 2 OF 2

Data Sheet No.: **PE-CL-999-145-I026-0**

SL NO	TESTS/CHECKS	QUANTM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS	AGENCY P	W	V	REMARKS
1.0	CHECK FOR		APPROVED TECHINCAL REQUIREMENT/ DATA SHEET				MFR TO CARRY OUT ROUTINE TEST ON 100%. WHEN MATL CORELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED
	1.1 DIAL SIZE	100%		M	C	C	
	1.2 MODEL NO/TAG NO	100%		M	C	C	
	1.3 RANGE/SCALE	100%		M	C	C	
	1.4 END CONNECTION	100%		M	C	C	
	1.5 SWITCH CONTACT RATING & NOS	100% M			C	C	
2.0	CALIBRATION						
	2.1 ACCURACY	100%		M	C	B	
	2.2 REPEATABILITY (FOR SWITCH)	100% M			C	B	
	2.3 SET POINT ADJUSTMENT FOR SWITCH	100% M			C	C	
3.0	OVER PRESSURE & LEAK TEST	100% M			C	C	
4.0	OPERATION OF PR. RELEIF DEVICE	ONE PER TYPE		M	C		C
5.0	REVIEW OF T.C. FOR MATERIAL OF--						
	5.1 SENSOR	FOR LOT		-	-	B	
	5.2 MOVEMENT			-	-	B	
	5.3 PROCESS CONNECTION			-	-	B	
	5.4 HOUSING			-	-	B	
6.0	REVIEW OF T.C. FOR DEGREE OF PROTECTION	TYPE TEST		-	-	B	
7.0	REVIEW OF T.C. FOR CONTACT RATING OF SWITCH	ONE PER TYPE		-	-	B	
8.0	ACCESSORIES AS APPLICABLE	100% M			C	C	

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NOTE:
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STANDARD QUALITY PLAN
FOR
SIGHT FLOW INDICATOR

QUALITY PLAN NO.: **PE-QP-999-145-I029**
VOLUME I IB
SECTION D
REV. NO. 00 DATE: 08.11.2000
SHEET 1 OF 2

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
1.0	**Material / Components**											
1.1	Body, Cover, Interns, Flanges, Gaskets	1. Physical, Chemical Properties	MA	Physical, Chemical Test	One Sample from each lot	Approved drg. / data sheet / BHEL Spec.	Approved drg. / data sheet / BHEL Spec.	Test Certificate	3/2 ---		2,1#	# Compliance certificate to be verified.
		2. Workmanship, finish and dimensions	MA	Visual, Measurement	100% Manufacturing standards / drgs.		Manufacturing standards / drgs.	Inspection Report / Log Book	3/2 ---		2,1#	
1.2	Window Glass	Strength, Transparency, dimensions	MA	Toughness & Thermal shock, Visual, Measurement	one sample from each lot	Approved drg. / data sheet / BHEL Spec.	Approved drg. / data sheet / BHEL Spec.	Test Certificate/ Inspection Report	3 ---		2,1#	
2.0	**Assembly**	1. Marking – Tag No., Model, Range	MA	Visual	100%	- do -	- do -	Inspection Report	2	1	---	
		2. Workmanship	MA	Visual	100%	- do -	- do -	- do -	2	1	---	
		3. Direction of flow stamping	MA	Visual	100%	- do -	- do -	- do -	2	1	---	
		4. Dimensions and end connections	MA	Measurement	100%	- do -	- do -	- do -	2	1	---	
3.0	**Routine Test**	1. Operation, Calibration⊕	CR	Measurement	100%	- do -	- do -	- do -	2	1**	1	⊕ For flapper type
		2. Hydro Test	CR	Measurement	100%	- do -	No Leakage	- do -	2	1**	1	**10% quantity with minimum of 1 piece / type & size

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STANDARD QUALITY PLAN
FOR
SIGHT FLOW INDICATOR

QUALITY PLAN NO.:	**PE-QP-999-145-I029**
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SECTION D	
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Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
4.0	**Painting**	Shade & Finish	MA	Visual	100%	Approved drg. / data sheet / BHEL Spec.	Approved drg. / data sheet / BHEL Spec.	Inspection Report	2	1**	1	
5.0	**Packing**	Soundness MA		Visual	100%	- do -	- do -	- do -	2	---	---	

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STANDARD QUALITY PLAN FOR LEVEL GAUGES

QUALITY PLAN NO.: **PE-QP-999-145-I028**
VOLUME I IB
SECTION D
REV. NO. 00 DATE: 01.11.2000
SHEET 1 OF 2

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
1.0	**Material / Components**											
1.1	Body, Cover, Interns, Flanges, Gaskets	1. Physical, Chemical Properties	MA	Physical, Chemical Test	One Sample from each lot	Approved drg. / data sheet / BHEL Spec.	Approved drg. / data sheet / BHEL Spec.	Test Certificate	3/2 ---		2,1#	# Compliance certificate to be verified.
		2. Workmanship, finish and dimensions	MA	Visual, Measurement	100% Manufacturing	Manufacturing standards / drgs.	Manufacturing standards / drgs.	Inspection Report / Log Book	3/2 ---		2,1#	
1.2	Glass Tube	Strength, Transparency, dimensions	MA	Toughness & Thermal shock, Visual, Measurement	one sample from each lot	Approved drg. / data sheet / BHEL Spec.	Approved drg. / data sheet / BHEL Spec.	Test Certificate/ Inspection Report	3 ---		2,1#	
2.0	**Assembly**	1. Marking – Tag No., Model, Range	MA	Visual	100%	- do -	- do -	Inspection Report	2	1	---	
		2. Workmanship	MA	Visual	100%	- do -	- do -	- do -	2	1	---	
		3. Scale graduation	MA	Visual	100%	- do -	- do -	- do -	2	1	---	
		4. Glass Opaque painting	MA	Visual	100%	- do -	- do -	- do -	2	1	---	For Reflex type
		5. Dimensions and end connections	MA	Measurement	100%	- do -	- do -	- do -	2	1	---	
3.0	**Routine Test**	1. Calibration	CR	Measurement	100%	- do -	- do -	- do -	2	1**	1	**10% quantity with minimum of 1 piece / type & size
		2. Hydro Test	CR	Measurement	100%	- do -	No Leakage	- do -	2	1**	1	

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STANDARD QUALITY PLAN FOR LEVEL GAUGES

QUALITY PLAN NO.: **PE-QP-999-145-I028**
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SHEET 2 OF 2

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
4.0	**Painting**	Shade & Finish	MA	Visual	100%	Approved drg. / data sheet / BHEL Spec.	Approved drg. / data sheet / BHEL Spec.	Inspection Report	2	1**	1	
5.0	**Packing**	Soundness	MA	Visual	100%	- do -	- do -	- do -	2	---	---	

LEGEND:
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STANDARD QUALITY PLAN FOR FLOW ORIFICE PLATE ASSEMBLY

QUALITY PLAN NO.:	**PE-QP-999-145-I024**
VOLUME	IIB
SECTION	D
REV. NO.	05 DATE: 30.05.13
SHEET	1 OF 2

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
1.0	**MATERIAL**											
1.1	Orifice Plate	1. Physical, Chemical properties	MA	Physical, Chemical Tests	One / Plate OR One/ Heat	AP / DS / SP	AP / DS / SP	Lab Report	3/2	---	2,1	IBR certification (if applicable) to be verified by BHEL
		2. Dimensions	MA	Measurement	100%	AP	AP	IR	3/2		1	
1.2	**Flanges** A. Forgings	Chemical,Mech Properties, UT & Heat Treatment	MA	Chem & Mech UT test	Sample	Material Spec as per ASTM A 388 for UT	ANSI B 16.34	MTC,UT cert,HT cert	3/2	---	1	
	B. Machining	Dimensions	MA	Measurement	100 %	AP / DS	AP / DS	IR	3/2	----	1	
2.0	**IN PROCESS** Machine	1. Dimension	MA	Measurement	100%	AP	AP	IR	3/2	2	2	
		2. Surface finish	MA	Visual	100%	----------	Mirror Finish	-------	3/2	2	---	
		3. Surface flaw on machined surface	MA	Penetrant test	100%	ASTM 165 / IS:3658	No surface flaw	IR / TC	3/2	2	1	
3.0	**ASSEMBLY and FINAL INSPECTION**	1. Overall dimensions	MA	Measurement	100%	AP	AP	IR	3/2	2,1	----	
		2. Marking, Tag no. Direction of flow	MA	Visual	100%	AP / DS	AP / DS	IR	3/2	2	1	
		3. Calibration	MA	Performance Test	One per type	----------	SP	TC	3/2		1	
		4 Painting	MA	Visual	100%	SP / MS	SP / MS	IR / MR	3/2	-----	1	

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
IR - Inspection Reports; TC - Test Certificates; AP – Approved Drawings/doc; DS – Data Sheet; SP – Tech. Spec.
MR- Manufacturer records; MS- Manufacturer standards
$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.
1 - BHEL; 2 - Vendor; 3 - Sub-vendor

PEM :: C&I

STANDARD QUALITY PLAN FOR FLOW ORIFICE PLATE ASSEMBLY

QUALITY PLAN NO.:	**PE-QP-999-145-I024**
VOLUME	IIB
SECTION	D
REV. NO.	05 DATE: 30.05.13
SHEET	2 OF 2

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
4.0	**PACKING**	Soundness of Packing against transit damage	MA	Visual	100%	SP / MS	SP / MS	----	3/2	----	----	Refer Note 4

NOTE:

1. All test reports & dimension reports shall be verified by BHEL wherever verification is by BHEL at the time of Final Inspection.
2. Minimum 2 coats of primer paint to be applied before dispatch.
3. CALIBRATION Test to be carried out at IIT-DELHI / FCRI or BHEL approved laboratory.
4. Sea Worthy packing, if applicable.

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics; IR - Inspection Reports; TC - Test Certificates; AP – Approved Drawings/doc; DS – Data Sheet; SP – Tech. Spec.; MR- Manufacturer records; MS- Manufacturer standards; $ P - Agency Performing the Test.; W - Agency Witnessing the Test.; V - Agency Verifying the Test.; 1 - BHEL; 2 - Vendor; 3 - Sub-vendor

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STANDARD QUALITY PLAN FOR RESISTANCE TEMPERATURE DETECTOR WITH THERMOWELL

QUALITY PLAN NO.:	**PE-QP-999-145-I025**
VOLUME	IIB
SECTION	D
REV. NO.	01 DATE: 21.03.2012
SHEET	1 OF 2

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
1.0	Raw Material / Component											
1.1	Resistance sheath	Material composition	CR	Chemical testing	One Sample from each lot	Approved drg. / data sheet	Relevant material std.	Test Certificate	3,2	---	2,1 ♠	♠Relevant compliance certificate to be verified.
1.2	Protective Sheath	Material composition	MA	Chemical testing		Approved drg. / data sheet	Relevant material std.	Test Certificate	3,2	---	2,1 ♠	
1.3	Terminal Head	Material composition	MA	Chemical testing		Approved drg. / data sheet	Relevant material std.	Test Certificate	3,2	---	2,1 ♠	
1.4	Thermowell⊕	1. Chemical properties	CR	Chemical composition	One Sample from each lot	Approved drg. / data sheet	Relevant material std.	Test Certificate	3,2	---	2,1	
		2. Dimensions (wall thickness concentrity of bore, OD & length)	MA	Measurement	100%	Approved drg., BHEL Spec.	Approved drg., BHEL Spec.	Inspection report	2	1♦	1	♦BHEL to witness 25% Samples
		3. Threading	MA	Thread matching	100%	Approved drg., BHEL Spec.	Approved drg., BHEL Spec.	Inspection Report	2	2,1♦	1	
		4. Leak Test **(Hyd. test at 1.5 times design press)**	CR	Visual	100%	Approved drg., BHEL Spec.	Approved drg., BHEL Spec.	Inspection Report	3,2	1**	2/1	⊕IBR certificate wherever specified to be verified. **10% of total quantity with minimum of 2 random piece/type & size

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics; Mfd std - Manufacturers' standard

$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.

1 - BHEL 2 - Vendor 3 - Sub-vendor

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STANDARD QUALITY PLAN FOR RESISTANCE TEMPERATURE DETECTOR WITH THERMOWELL

QUALITY PLAN NO.:	**PE-QP-999-145-I025**
VOLUME	IIB
SECTION	D
REV. NO.	01 DATE: 21.03.2012
SHEET	2 OF 2

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
2.0	**Final Inspection**											
2.1	RTD Assembly	1. Workmanship	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Inspection Report	2	----	1♠	
		2. Marking	MA	Visual	100%				2	----	1♠	
		3. Dimensions	MA	Measurement	100%				2	----	1♠	
2.2	Routine Tests	1. Calibration (Resis Vs. Temp.)	CR	Measurement	100%	IS:2848	IS:2848	Test Report	2	2	1	
		2. Insulation Resistance	MA	Electrical	100%	IS:2848	IS:2848	Test Report	2	1	---	
		3. Thermal Response time	CR	Measurement	One Sample from each type	IS:2848	IS:2848	Test Certificate	2	1	---	
2.3	Type Test	Enclosure protection test	CR	Verification	Each type	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	3/2	---	1*	*Type Test Certificate (not more than 5 year old) to be verified
3.0	Packing	Soundness of packing	MA	Visual	100%	Mfd std.	Mfd std.	Inspection Report	3/2	2	---	Visual

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics; Mfd std - Manufacturers' standard

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1 - BHEL 2 - Vendor 3 - Sub-vendor

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STANDARD QUALITY PLAN FOR TEMPERATURE GAUGE AND THERMOWELL

QUALITY PLAN NO.:	**PE-QP-999-145-I027**
VOLUME	IIB
SECTION	D
REV. NO.	01 DATE: 16-05-2007
SHEET	1 OF 4

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W		V	Remarks
1.0	**Raw Material / Component**												
1.1	Capillary Bulb and Thermowell	1. Chemical composition	CR	Chemical analysis	one sample/ lot	BHEL spec. / approved data sheet	Relevant raw material std.	Test report	3/2	---		2,1	Relevant compliance certificate to be verified by BHEL
		2. Marking,	MA	Visual	100%	BHEL spec. / Mfr. Standard	BHEL spec. / Mfr. Standard	Log Book	2	---		---	
		3. Dimensions	MA	Measurement	100%	BHEL spec. / approved doc	BHEL spec. / approved doc	Log Book	2	---		---	
1.2	Casing and Bezel	1. Material	MA	Chemical analysis	Sample	BHEL spec.	BHEL spec.	Test report	3/2	---		2,1	Relevant compliance certificate to be verified by BHEL
		2. Defects	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Log Book	2	---		---	
		3. Dimension	MA	Measurement	Sample	BHEL spec. / approved doc.	BHEL spec. / approved doc.	Log Book	2	---		---	
		4. Threading	MA	Thread matching	100%	-------do--------	-------do--------	Log Book	2	---		---	
1.3	Dial	1. Size, range, scale length, least-count, spacing and graduation.	MA	Measurement and Visual	Sample	BHEL spec.	BHEL spec.	Log Book	2	---		---	
		2. Colour	MA	Visual	100%	BHEL spec.	BHEL spec.	Log Book	2	---		---	
		3. Resistance to dry heat and hot water	MA	Oven & Bath	Sample	Mfr. Standard	Mfr. Standard	Test report	3/2	---		---	

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics

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1 - BHEL 2 - Vendor 3 - Sub-vendor

PEM :: C&I

STANDARD QUALITY PLAN FOR TEMPERATURE GAUGE AND THERMOWELL

QUALITY PLAN NO.:	**PE-QP-999-145-I027**
VOLUME	IIB
SECTION	D
REV. NO.	01 DATE: 16-05-2007
SHEET	2 OF 4

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W	V	Remarks
1.4	Complete sensing element	1. Correct assembly and workmanship.	MA	Visual	100%	Mfr. Standard drawing	Mfr. Standard drawing	Log Book	2	---	---	
		2. Dimensions	MA	Measurement	100%	Mfr. Standard drawing	Mfr. Standard drawing	Log Book	2	---	---	
		3. Welding & other defects	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Log Book	2	---	---	
1.5	Thermowell ⊕	1. Dimensions of wall thickness, concentricity of bore OD & Length.	MA	Measurement	100%	BHEL spec. / approved data sheet / Drg.	BHEL spec. / approved data sheet / Drg.	Log Book	2	1	1	BHEL to witness 10 % random samples.
		2. Leak Test	CR	Hyd. test at 1.5 times of design pressure.	100%	BHEL spec. / approved data sheet / Drg.	BHEL spec. / approved data sheet / Drg.	Inspection report	3/2	2,1	1	⊕ IBR cert. wherever specified to be verified.
		3. Threading	MA	Thread matching	100%	BHEL spec. / approved data sheet / Drg	BHEL spec. / approved data sheet / Drg	Inspection report	2	2,1	1	BHEL to witness 10% samples.
2.0	Final Inspection											
2.1	Assembly	1. Correct assembly, workmanship and finish	MA	Visual	100%	BHEL spec. / approved data sheet	BHEL spec. / approved data sheet	Inspection report	2	1	---	

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics

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1 - BHEL 2 - Vendor 3 - Sub-vendor

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks
		2. Mounting and connection	MA	Visual ad measurement	100%	---------do---------	---------do---------	Inspection report	2	1	---	
		3. Dial Scale	MA	Visual	100%	---------do---------	---------do---------	Log Book	2	1	---	
		1. Cleanliness	MA	Visual	100%	---------do---------	Free from scratches, dirt etc.	Log Book	2	---	2	
		5. Marking (S.No., Tag No.)	MA	Visual	100%	BHEL spec. / approved data sheet	BHEL spec. / approved data sheet	Log Book	2	1	---	
2.2	Routine Test	1. Accuracy	MA	Measurement	100%	BHEL spec. / Approved data Sheet.	BHEL spec. / Approved data Sheet.	Test Report	2	1	1	BHEL to witness 10% random Samples.
		2. Overload	CR	Measurement	10%	125% of FSD for range upto 400 Deg. C. 110% of FSD for range between 400 to 500 Deg. C. 100% of FSD for range above 500 Deg. C.	No Damage	Test Report	2	1	---	

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1 - BHEL 2 - Vendor 3 - Sub-vendor

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STANDARD QUALITY PLAN FOR TEMPERATURE GAUGE AND THERMOWELL

QUALITY PLAN NO.:	**PE-QP-999-145-I027**
VOLUME	IIB
SECTION	D
REV. NO.	01 DATE: 16-05-2007
SHEET	4 OF 4

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W	V	Remarks
		3. Response Time	MA	Measurement	10%	ASME PTC19.3	ASME PTC19.3	Test Report	2	1	1	BHEL to witness 10% random samples.
2.3	Type Test	1. Ambient temperature compensation 0-60 Deg. C	MA	Measurement	Sample	Bulb at constant temp. & case temp varied 0-60 Deg. C	No variation in measurement	Test Certificate	2	---	1	Existing test certificate (Not more than 5 year old) shall be furnished.
		2. Weather proofness	CR	Measurement	Sample	BHEL spec. / Approved data sheet.	BHEL spec. / Approved data sheet.	Test Certificate	3/2	---	1	---do---
3.0	Packing	Soundness of packing	MA	Visual	100%	BHEL Spec.	BHEL Spec.	Log Book	3/2	2	---	Refer Note-1

Note: 1. In the absence of BHEL specification for painting, vendor to obtain BHEL's approval on their painting specification / procedure.

LEGEND:
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$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.
1 - BHEL; 2 - Vendor; 3 - Sub-vendor

PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	**PE-QP-999-145-I 006**
VOLUME	IIB
SECTION	D
REV. NO.	06 DATE: 05.09.2013
SHEET	1 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W	V	Remarks
1.0 M	**ATERIAL**											
1.1	Body & Bonnet casting / forgings, plug, valve stem, seat ring/cage.	1. Physical, Chemical properties	MA	Physical, Chemical tests	One/ Heat(HT Batch)	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3	---	2,1	
		2. Heat Treatment	MA	Review of H.T. Chart	Each H.T.	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Test Certificate	3/2	2	1	IBR Certification (if applicable) to be verified by BHEL
		3. Internal quality of castings	MA	RT for Body & UT for Bonnet(NDT)	100%	ASME B 16.34	ASME B 16.34	Test Report / FILM	3/2	2	1	Only for rating ANSI 900 and above. Applicable for Body and Bonnet only. For Lower rating only if called for in specification.
		4. Surface Quality	MA	1. Visual	100%	MSS-SP-55	MSS-SP-55	Test Certificate	3/2	---	2,1	
				2. MT/PT	100%	ASME B 16.34	ASME B 16.34	Test Certificate	3	2	1	After Machining on machined surface only

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
RT- Radiographic Test; UT – Ultrasonic Test
PT – Dye penetrant Test; MT- Magnetic Test
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1 - BHEL; 2 - Vendor; 3 - Sub-vendor

PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	**PE-QP-999-145-I 006**
VOLUME	IIB
SECTION	D
REV. NO.	06 DATE: 05.09.2013
SHEET	2 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks
		5. Pressure test for shell	MA	Hyd. Test	100%	ISA-S-75.19/ ASME B 16.34	ISA-S-75.19/ ASME B 16.34	Test Certificate	2	2	1	For Body & Bonnet after machining
1.2	Diaphragm	1. Surface Quality	MA	Visual	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2,1	
		2. Hardness	MA	Measurement	100%	Mfr. standard	Mfr. standard	Test Certificate	3/2	---	2,1	
		3. Endurance / Life cycle	MA	Cyclic test 10,000 cycles	One / Type	10,000 cycles/ Mfr. standard.	No damage	Test Certificate	3/2		2,1	
1.3	Spring	1. Composition	MA	Chemical-Analysis	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
		2. Mech. Properties	MA	Mech. Test	One sample/ Heat	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
		3. Performance	MA	1. Stiffness ratio	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				2. Scragging	100%	Material spec. / Mfr. standard	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				3. Cyclic test (Endurance)	One / type	10,000 cycles	Material spec. / Mfr. standard	Test Certificate	3	---	2,1	
				4. Dimension (Measurement)	One sample/ Lot	Mfr. standard	Appd Drg	Record	3	---	2,1	

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RT- Radiographic Test; UT – Ultrasonic Test; PT – Dye penetrant Test; MT- Magnetic Test
$ P - Agency Performing the Test.; W - Agency Witnessing the Test.; V - Agency Verifying the Test.
1 - BHEL; 2 - Vendor; 3 - Sub-vendor

PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	**PE-QP-999-145-I 006**
VOLUME	IIB
SECTION	D
REV. NO.	06 DATE: 05.09.2013
SHEET	3 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W		V	Remarks
1.4	Electrical items [Limit switches, Solenoids, Position Transmitter(if provided externally)]	1. Routine Test	MA	HV, IR, Continuity function	100%	Rele. Standards	Rele. Standards	Test Certificate	3	---		2,1	In case TC is not available, Actual test shall be conducted
		2. Degree of protection	MA	IP/NEMA Tests	One sample / type	Approved Data sheet	Approved Data sheet	Test Certificate	3	---		2,1	
1.5	Pressure Gauges	1. Performance	MA	Review of calibration certificates	100%	Mfr. Standard	Mfr. Standard	Test Certificate	3	---		2,1	
		2. Marking	MA	Visual	100%	Mfr. standard	Mfr. standard	Records	3	---		2,1	
2.0	**I N PROCESS INSPECTION**												
2.1	After machining, i, Body ii Bonnet iii Plug iv Valve Stem v seat ring/cage	1. Surface flaws	MA	Visual & MT/PT	100% (on accessible surfaces)	ASME B 16.34	ASME B 16.34	Test Records	2	---		1	Butt weld ends shall be included.
		2. Dimensional checks	MA	Measurement	100%	Mfr. Standard	Mfr. Standard	Records	2	---		1	
		3. Hard facing (wherever applicable)	MA	Hardness Measurement	One sample/Lot	Mfr. Standard	Mfr. Standard	Records	2	---		1	
2.2	Lapping	Machining surface contact	MA	Blue Matching	One sample/lot	------	Proper Physical Contact	---	2	---		---	
3.0	**TESTS ON COMPLETED VALVE**												

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
RT- Radiographic Test; UT – Ultrasonic Test; PT – Dye penetrant Test; MT- Magnetic Test
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1 - BHEL; 2 - Vendor; 3 - Sub-vendor

PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	**PE-QP-999-145-I 006**
VOLUME	IIB
SECTION	D
REV. NO.	06 DATE: 05.09.2013
SHEET	4 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	W		V	Remarks
3.1	Actuator Chamber	Leakage & Strength	MA	Pneumatic test	100%	Mfr. Standard	No Leakage	Test Certificate	2	1		1	Refer Note-4
3.2	Body	Leakage and Pressure test (Body Mount Leakage)	MA	Hydro test	100%	ISA - S-75.19	No Leakage	Test Certificate	2	1		1	Refer Note-4
3.3	Seat leakage test for completed valve	Seat Leakage	MA	Pneumatic Test	100%	FCI-70.2	FCI-70.2	Test Certificate	2	1		1	Refer Note-4
4.0	**OPERATION TEST ON COMPLETED VALVE (Final inspection)**	1. Valve Travel	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1		1	Refer Note-4
		2. Opening/Closing time	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1		1	Refer Note-4
		3. Linearity/cam characteristic	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1		1	Refer Note-4
		4. Repeatability	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1		1	Refer Note-4
		5. Hysteresis	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1		1	Refer Note-4
		6. Sensitivity	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1		1	Refer Note-4
		7. Accuracy (Overall)	MA	Measurement	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Report	2	1		1	Refer Note-4
		8. Control Valve characteristics / CV Test	MA	♦Measurement (Press. vs. discharge and discharge vs. opening 0-100% in steps of 10%)	One per type	As per specs/ Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	2	--		1	♦Size = Body & port size Or Body size & CV for non std port. Refer Note 1.

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
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PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	**PE-QP-999-145-I 006**
VOLUME	IIB
SECTION	D
REV. NO.	06 DATE: 05.09.2013
SHEET	5 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks
		9. Operation of limit switch & solenoids and other accessories	MA	Function	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Report	2	1	1	On assembled valve Refer Note-4
		10. Overall dimensions	MI	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Records	2	1	1	Refer Note-4
		11. Pre defined valve position in case of air failure	MA	Visual	100%	As per spec & Appd drg	As per spec & Appd drg	Test Certificate	2	1	1	
		12. Cleanliness, painting, stamping (for direction of flow), Tag No.	MA	Visual and dimensional	100%	Approved drg. / data sheet	As per specs/ Approved drg. / data sheet	Test Certificate	2	1	1	
5.0	**AUXILIARY ITEMS (Performance test of auxiliary items shall be performed on the completely assembled valve)**											
5.1	Positioner	Overall leakage after assembly including Nozzles leakage	MA	Leak Test (in the steady state input signal)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	Overall leakage including tubing
5.2	Air filter regulator	1. Normal air consumption	MA	Measurement	Each type	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
		2. Overall leakage	MA	Visual (soap solution)	100 %	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
5.3	Air lock relay	Performance Test	MA	Leakage test	100%	Mfr. Standard	No leakage	Test Certificate	3/2	---	1	
5.4	Electronic position transmitter(not applicable if provided integral to smart positioner)	1. Accuracy	MA	Operation	100%	Approved data sheet /	Approved data sheet /	Test Certificate	2	1	1	

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PEM :: C&I

STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)

QUALITY PLAN NO.:	**PE-QP-999-145-I 006**
VOLUME	IIB
SECTION	D
REV. NO.	06 DATE: 05.09.2013
SHEET	6 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks
5.5	Current to Pneumatic converter(not applicable for smart positioner)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	2,1	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	2,1	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
5.6	Smart Positioner (As Applicable)	1. Physical Verification Make/Model	MA	Visual	100%	Approved drg. / data sheet	Approved drg. / data sheet	Test Certificate	2	---	2,1	
		2. Degree of Protection	MA	IP/NEMA test	Each type	Relevant Standard	Relevant Standard	Test Certificate	3	---	2,1	
		3. Linearity	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		4. Hysterisis	CR	Measurement	100%	Approved drg. / data sheet / BHEL specn.	Approved drg. / data sheet / BHEL specn.	Inspection Report	2	---	1	
		5. Calibration with Hand Held Communicator	MA	Measurement	Each type	Approved data sheet / Mfr. Standard	Approved data sheet / Mfr. Standard	Test Certificate	2	1	1	
6.0 P	**AINTING**	Soundness of Painting	MA	Visual and Measurement	100%	BHEL specn. / Mfr. Standard	BHEL specn. / Mfr. Standard	Inspection Report	2	---	---	Refer Note-2
7.0 P	**ACKING**	Soundness of Packing against transit damage	MA	Visual	100%	Mfr. Standard	Mfr. Standard	Inspection Report	2	---	---	Refer Note-3

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
RT- Radiographic Test; UT – Ultrasonic Test; PT – Dye penetrant Test; MT- Magnetic Test
$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.
1 - BHEL; 2 - Vendor; 3 - Sub-vendor

PEM :: C&I	STANDARD QUALITY PLAN FOR CONTROL VALVE (PNEUMATIC)	QUALITY PLAN NO.: **PE-QP-999-145-I 006**
		VOLUME IIB
		SECTION D
		REV. NO. 06 DATE: 05.09.2013
		SHEET 7 OF 7

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks

NOTES:

1. In case valid CV test certificate for a similar control valve(Same type, Same size, Same CV) is not submitted to BHEL by the vendor, CV test shall be conducted at FCRI/Any govt. approved laboratory/ BHEL approved Laboratory.
2. In the absence of BHEL spec. for painting, vendor to obtain BHEL's approval on their painting specification / procedure.
3. Sea worthy packing shall be provided, if applicable.
4. The quantum of check shall be 100% for manufacturer and 10% for BHEL/BHEL nominated inspection agency.
5. IBR certificates in Form III-C shall be submitted if called for in the specification/datasheet.
6. Copies of all TC's(Test Certificates) for materials duly correlated with Heat Nos., TC's for electrical items and mechanical tests(Leak/Operation) shall be submitted to BHEL for verification and acceptance.

LEGEND:
* CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
RT- Radiographic Test; UT – Ultrasonic Test
PT – Dye penetrant Test; MT- Magnetic Test
$ P - Agency Performing the Test.; W - Agency Witnessing the Test.; V - Agency Verifying the Test.
1 - BHEL; 2 - Vendor; 3 - Sub-vendor

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR FLOW SWITCH

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **				Remarks
				M	C	B	D *	
1	TYPE, MODEL, SL. No., TAG No., RANGE	100%	APPROVED SPEC./ DATA SHEETS	P	W	V	R	
2	SIZE, DIMENSIONS	100%	-do-	P	W	V	R	
3	ACCURACY & REPEATABILITY (WET CALIBRATION)	100%	-do-	P	W	V	R	
4	HV / IR	100%	-do-	P	W	V	R	
5	CONTACT RATING / No. OF CONTACTS	RANDOM	-do-	P	W	V	R	
6	MATERIAL TC FOR BODY, WET PARTS, SENSING ELEMENT	ONE / LOT	-do-	P	W	V	R	
7	ACCESSORIES AS APPLICABLE	100%	-do-	P	W	V	R	
8	DEGREE OF PROTECTION	ONE / LOT	-do-	P	W	V	R	
9	OVER PRESSURE TEST	100%	-do-	P	W	V	R	

Legend :

* Records identified with "R" shall be essentially included by Contractor in QA documentation.

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, D = Drawings / Documents, P = Perform, W = Witness, V = Verification

Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
   25 % - By BHEL & Customer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
3. In case of imported items, contractor shall review TC's and not inspect.
4. MFR to carry out routine test for 100%

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR TEMPERATURE SWITCH

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **				Remarks
				M	C	B	D *	
1	TYPE, MODEL, SL. No., TAG No., RANGE	100%	APPROVED SPEC./ DATA SHEETS	P	W	V	R	
2	DIMENSIONS CHECK	100%	-do-	P	W	V	R	
3	ACCURACY	100%	-do-	P	W	V	R	
4	SWITCHING DIFFERENTIAL	100%	-do-	P	W	V	R	
5	CONTACT RATING / No. OF CONTACTS	RANDOM	-do-	P	W	V	R	
6	MATERIAL TC FOR BULB, CAPILLARY, ARMOUR	ONE / LOT	-do-	P	V	V	R	
7	HV / IR	RANDOM	-do-	P	W	V	R	
8	DEGREE OF PROTECTION	TYPE TEST	-do-	P	V	V	R	
9	THERMOWELLS							
9.1	DIMENSIONS,PROCESS CONN	100%	-do-	P	W	V	R	
9.2	MATERIAL TC	ONE / LOT	-do-	P	V	V	R	
9.3	HYD TEST	100%	-do-	P	W	V	R	
9.4	IBR CERTIFICATE, IF APPLICABLE		-do-	P	V	V	R	
10	REPEATABILITY	100%	-do-	P	V	V	R	
11	HYSTERISIS	100%	-do-	P	V	V	R	

Legend :

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Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
   25 % - By BHEL& Customer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
3. In case of imported items, contractor shall review TC's and not inspect.
4. MFR to carry out routine test for 100%

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR ANNUNCIATORS

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **				Remarks
				M	C	B	D *	
1	CHECK FOR TYPE, MODEL,DIMENSIONS OF HARDWARE,MODULARITY, SEQUENCE, FACIA DETAILS	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	R	
2	FUNCTIONAL TEST	100 %	-do-	P	W	V	R	
3	IMMUNE TO STEP VARIATIONS IN THE POWER SUPPLY	SEE NOTE-1 BELOW	-do-	P	W	V	R	
4	DEGREE OF PROTECTION FOR ENCLOSURE	TYPE TEST	-do-	P	W	V	R	
5	I/R CHECK	SEE NOTE-1 BELOW	-do-	P	W	V	R	
6	RESPONSE	SEE NOTE-1 BELOW	-do-	P	W	V	R	

Legend :

* Records identified with "R" shall be essentially included by Contractor in QA documentation.

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, D = Drawings / Documents, P = Perform, W = Witness, V = Verification

Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
   50 % - By BHEL & Customer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
3. Manufacturer to carry out ROUTINE TEST on 100 %.

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR BYPASS ROTAMETERS

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **				Remarks
				M	C	B	D *	
1	CHECK FOR MODEL,TAG No., VISUAL	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	R	
2	DIMENSIONS,	-do-	-do-	P	W	V	R	
3	PROCESS CONNECTION	-do-	-do-	P	W	V	R	
4	RANGE / SCALE	-do-	-do-	P	W	V	R	
5	ACCURACY	-do-	-do-	P	W	V	R	
6	MATERIAL TC FOR METERING TUBE, ORIFICE PLATE, FLANGES AND FASTNER	-do-	-do-	P	V	V	R	
7	CALIBRATION REPORT	ONE / SIZE	-do-	P	V	V	R	
8	SURFACE FINISH OF ORIFICE PLATE	-do-	MANUFACTURER'S STANDARD	P	V	V	R	

Legend :

* Records identified with "R" shall be essentially included by Contractor in QA documentation.

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, D = Drawings / Documents, P = Perform, W = Witness, V = Verification

Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
   25 % - By BHEL & Customer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
3. Manufacturer to carry out ROUTINE TEST on 100 %.

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR TRANSMITTER

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **				Remarks
				M	C	B	D *	
1	CHECKS FOR VISUAL, MODEL, TAG No.	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	R	
2	PROCESS CONNECTION	-do-	-do-	P	W	V	R	
3	ACCURACY	-do-	-do-	P	W	V	R	
4	REPEATABILITY	-do-	-do-	P	W	V	R	
5	HYSTERESIS	-do-	-do-	P	W	V	R	
6	EFFECT OF TEMP VARIATION ON ACCURACY	-do-	-do-	P	W	V	R	
7	SPAN / ZERO ADJUSTMENT	ONE / TYPE	-do-	P	W	V	R	
8	EFFECT OF SUPPLY VOLTAGE VARIATION	ONE / TYPE	-do-	P	W	V	R	
9	EFFECT OF LOADING (500 OHM METERS)	ONE / TYPE	-do-	P	W	V	R	
10	HIGH PRESSURE TEST	SEE NOTE-1 BELOW	-do-	P	W	V	R	
11	BURN-IN TEST	ONE / TYPE	-do-	P	W	V	R	
12	DEGREE OF PROTECTION	ONE / TYPE	-do-	P	W	V	R	

Legend :

* Records identified with "R" shall be essentially included by Contractor in QA documentation.

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, D = Drawings / Documents, P = Perform, W = Witness, V = Verification

Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
   Random for each type - By BHEL& Customer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
3. In case of imported items, contractor shall review TC's and not inspect.
4. Manufacturer to carry out ROUTINE TEST on 100 %.

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR TEMPERATURE ELEMENT

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **				Remarks
				M	C	B	D *	
1	CHECKS FOR TYPE, MODEL No., TAG No., PROCESS CONN.	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	R	
2	STABILITY	-do-	-do-	P	W	V	R	
3	INSULATION RESISTANCE	-do-	-do-	P	W	V	R	
4	ENCLOSURE CLASS	-do-	-do-	P	W	V	R	
5	RESPONSE TIME	-do-	-do-	P	W	V	R	
7	ACCURACY	-do-	-do-	P	W	V	R	
8	HYDROSTATIC TEST	-do-	-do-	P	W	V	R	
9	ELECTRICAL CHARACTERISTIC OF SENSOR (CONTINUTY OF T/C WIRES & INSULATION RESISTANCE OF RTD LEADS w.r.t. BODY	-do-		P	W	V	R	
10	TEMP CURVES / CHARTS			P	V	V	R	
11	AMBIENT TEMP. EFFECT CHECK	-do-	-do-	P	W	V	R	
12	HV TEST	-do-	-do-	P	W	V	R	

Legend :

* Records identified with "R" shall be essentially included by Contractor in QA documentation.

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Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
   Random - By BHEL & Customer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR ANALYTICAL INSTRUMENTS

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **				Remarks
				M	C	B	D *	
1	CHECK FOR VISUAL, MAKE, MODEL No., POWER SUPPLY	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	V	V	R	
2	DIMENSIONS CHECK	-do-	-do-	P	V	V	R	
3	FUNCTIONAL CHECK	-do-	-do-	P	V	V	R	
4	LEAKAGE TEST	-do-	-do-	P	V	V	R	
5	HV / IR TEST	-do-	-do-	P	V	V	R	
6	LINEARITY	-do-	-do-	P	V	V	R	
7	RESPONSE TIME	-do-	-do-	P	V	V	R	
8	ENCLOSURE CLASS	-do-	-do-	P	V	V	R	TYPE TEST CERTIFICATE TO BE FURNISHED BY VENDOR
9	ACCESSORIES, AS APPLICABLE	-do-	-do-	P	V	V	R	
10	ACCURACY / CALIBRATION	-do-	-do-	P	V	V	R	
11	ALARM CONTACT TEST	-do-	-do-	P	V	V	R	
12	ANALOG OUTPUT CHECK	-do-	-do-	P	V	V	R	
13	BURN-IN TEST OF ELECTRONIC PARTS	1/LOT	-do-	P	V	V	R	
14	IN-BUILT INDICATOR, ZERO, SPAN, RANGE SCALE SELECTION ETC	SEE NOTE-1 BELOW	-do-	P	V	V	R	

Legend :

* Records identified with "R" shall be essentially included by Contractor in QA documentation.

** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, D = Drawings / Documents, P = Perform, W = Witness, V = Verification

Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
   100 % - By BHEL & Customer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.
3. In case of imported items, contractor shall review TC's and not inspect.

STANDARD CHECK LIST FOR C&I INSTRUMENTS (for Maux Pkgs)

CHECK LIST FOR SOLENOID VALVES

Sl. No.	Test / Checks	Quantum of check	Reference Doc. / Acceptance Norms	Agency **				Remarks
				M	C	B	D *	
1	CHECK FOR TYPE, MAKE, MODEL No.	SEE NOTE-1 BELOW	APPROVED SPEC./ DATA SHEETS	P	W	V	R	
2	MATERIAL	-do-	-do-	P	W	V	R	
3	PORT SIZE	-do-	-do-	P	W	V	R	
4	CABLE CONNECTION SIZE	-do-	-do-	P	W	V	R	
5	ENCLOSURE CLASS	-do-	-do-	P	W	V	R	TYPE TEST CERTIFICATE TO BE FURNISHED BY VENDOR
6	No. OF COILS & INSULATION CLASS	-do-	-do-	P	W	V	R	TEST CERTIFICATE TO BE FURNISHED FOR INSULATION CLASS BY VENDOR
7	POWER SUPPLY CHECK	-do-	-do-	P	W	V	R	
8	IR / HV TEST	-do-	-do-	P	W	V	R	
9	FUCTIONAL TEST	-do-	-do-	P	W	V	R	

Legend :

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** M = Manufacturer / Sub-contractor, C = Contractor / Nominated Inspecting Agency, B = BHEL, D = Drawings / Documents, P = Perform, W = Witness, V = Verification

Note :

1. Quantum of check shall be as below :
   100 % - By Manufacturer
   25 % - By BHEL & Customer
2. Manufacturer to maintain calibrated instrument having better accuracy than the item under test. Inspecting engineer shall check the same.

ANNEXURE II: SUB VENDORS

SR No.	Items	Approved Vendor	Place
1	Hydrogen gas generator with purification system	Approved Main supplier own make	
2	Hydrogen Compressor with Motor	PPI	USA
		PDC Machines INC.	USA
		Burton Corblin	U.K
		Gardner Denver	USA
		Beijing Yitong Huizhi Co., Ltd.	China
		Seybert & Rahier	Germany
3	Combustible Gas Detector	MSA INDIA	Kolkatta
		Sierra Monitor	USA
		Unifoss	Gujrat
4	O2 Percent, O2 PPM and DEW Point Analyser	Teledyne	USA
		GE Sensing	Ireland

5	Conductivity Meter	Hach (GLI International)	
		Emmerson	
		Honeywell	
		AIC Controls	
6	Hygrometer	GE Sensing	
		Miechel Instruments	
7	Portable H2 purity Analyser	Teledyne	USA
		GE Sensing	Ireland
8	Vacuum pump	Acmevac Sales Pvt. Ltd	Mumbai
		DICON Products	Chennai
		Joyam Engg.	Ahmedabad
9	Hydrogen Dryer	Mellcon ENGS	Delhi
		Jindal Elect	Rourkee.

10	Cylinder test station	Indian compressors Limited	Delhi
		Eastern Electrolyser	Noida
		Airox Nigen	Ahemdabad
11	N2 / H2 Cylinders	BPCL	Allahabad
		Maruti kotasu	Aurangabad
		Everst Kanto	Halol
12	Zenner Barrier	MTL Barrier	
		P & F	
13	Air Compressor	Ingersoll Rand	Ahmedabad
		K.G.Khosla /KPC	Faridabad / Pune
14	Strainers (Y-Type & Basket Type)	MULTITEX FILTRATION ENGINEERS LIMITED,	Noida
		Sarojini Enterprises	Kolkata
		Otoklin Filters	Mumbai
		BHATIA ENGINEERING CO.	Delhi

		JAYPEE INDUSTRIES PVT. LTD.	Delhi
		FILTERATION ENGINEERS (I) PVT. LTD.	MUMBAI
		OTOKLIN GLOBAL BUSINESS LIMITED	Mumbai
		SUNGOV ENGINEERING PVT. LTD.	Delhi
		Grand Prix	Faridabad
15	Fittings	M.S. Fittings	Kolkata
		Metal lloyds	Mumbai
		True Forge	Faridabad
		Tube Products	Baroda
		NL Hazra	Kolkata
		Gujrat Infra Pipes	Baroda
		Edwards	USA
		Pipefit Engineers	Baroda
		Siddarth & Gautam	Faridabad
		EBY	Mumbai
16	MS/GI ERW Pipes	SAIL	Rourkela
		Jindal	Ghazibad/Hissar
		Surya Roshni	Bahadur Garh
		TATA Tube	Jamshedpur
		PSL	Chennai/Vizag/Kutch /Daman

		Lalit Profile	Thane
		Samshi Pipes Industries	Vadodara
		Mukut Pipes	Rajpura
		Indus Tubes	G B Nagar
		Mann Ind	Indore
		Surendra Engg	Rajpura
		Pratibha Pipes & Structure Pvt Ltd	Thane
		JCO Gas Pipe	Chindwara
		Nukat Tanks and Vessels	Tarapur
		DADU Pipes	Sikrandrabad
		Good Luck Tubes	Sikandrabad
		Advance Steel Tubes	Sahibabad
		Bihar Tubes	Sikandrabad
		Hi Tech Pipes	Sikandrabad
		Ratnamani	Kutch/Ahmedabad/Chhatral
		Maharashtra Seamless	Raigad
		Welspun	Anjar/Bharuch
17	Seamless Pipes	ISMT	Ahmednagar/Baramati
		Maharashtra Seamless	Raigad
18	S.S. Pipes	REMI	Mumbai
		Ratmani	Ahmedabad
		Apex Tubes	Behror

		Choksi	Ahmedabad
19	S.S. Tubes	Swagelok	USA
		Parker	USA
20	CI Gate/ Globe/NRV/SRV	H.Sarkar	Howrah
		A.V. VALVES LTD	Agra
		Leader	Jalandhar
		SURYA VALVES AND INSTRUMENTS MFG CO.	Chennai
		ATAM VALVES PVT. LTD.	JALANDHAR
		FLUIDLINE VALVES COMPANY PVT.LTD.	Mumbai
		G.M. DALUI AND SONS PVT.LTD.	Howrah
		KBL	Kondhapuri
		Bankim	Kolkata
		VENUS PUMPS AND ENGG. WORKS	Kolkata
21	SS Valves	Compair Systems	Canada
		Hamlet	Canada

		BDK	Kolkata
22	Solenoid Valve	Rotex	Baroda
		Avcon	Mumbai
		Asco	Chennai
		SMC	Noida
		Nucon	Hyderabad
25	Siren	Kheraj	-
		FPS Vendor approved suppliers	
26	Motor (Non Flame Proof)	Marathon,	kolkata
		Crompton Greaves	Ahmednagar
		NGEF	Bangalore
		ABB	Bangalore/Faridabad
		Siemens	Mumbai
		Jyoti	Baroda
		LHP	Solapur
		BHEL	Bhopal
		Bharat Electric (BHEL)	
		Bharat Bijlee	Mumbai
		KEC	Bangalore/Hubli
27	Motor (Non Flame Proof)	Kirloskar	Hubli
		Crompton Greaves	Ahmednagar
		Marathon	USA
		Bharat Bijli	Mumbai

		ABB	
28	Lighting Panel (Wall mounted)	Positronics	Baroda
		Pyrotech	Udaipur
29	Luminaries & Lamps	CGL	Mumbai
		Bajaj	Mumbai
		Philips	Kolkata
30	Flame proof lighting fixtures, JB, PB	Baliga	Chennai
		Ajmera	Mumbai
		Flexpro	Navsari
31	ROTAMETER	SWITZER	
		EUREKA	
		INSTRUMENT ENGINEERS	
		Indfoss	Ghaziabad
32	Safety Barrier	MTL Barrier	
		P & F	
33	DM Water & KOH	Sintex	Kalol
		Newgen Speciality Plastics Ltd	Greater Noida

		Rolta	India
34	Air Conditioner	Carrier	
		LG	
		HITACHI	
		BLUE STAR	
35	Ventilation Fans	Marathon Electric	
		Khatan	
		ABB	
		Bajaj	
		Alstom	
36	Paint (common items)	Shalimar	
		ICI	
		Asian	
		Berger	

S. No.	**Deptt.**	**Package**	**PMD Vendor/ Sub Vendor**	**Vendor Address**	**Remarks**	**HYDROGEN GENERATION PLANT**
1	Electrical	LV MOTORS (NON FLAME PROOF)	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	Sub vendor	YES
2	Electrical	LV MOTORS (NON FLAME PROOF)	BHARAT BIJLEE LTD.	BHARAT BIJLEE LIMITED, 1ST FLOOR, 7-B, RAJINDRA PARK, PUSA ROAD, NEW DELHI - 110 060.	Sub vendor	YES
2	Electrical	LV MOTORS (NON FLAME PROOF)	CROMPTON GREAVES	3RD FLOOR, EXPRESS BUILDING,9-10, BAHADUR SHAH ZAFAR MARG, NEAR ITO CROSSING,NEW DELHI-110002, INDIA	Sub vendor	YES
3	Electrical	LV MOTORS (NON FLAME PROOF)	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	Sub vendor	YES
3	Electrical	LV MOTORS (NON FLAME PROOF)	KIRLOSKAR ELECTRIC CO LTD.	P.O. BOX 5555 , MALLESWARAM WEST ,BANGALORE 560055	Sub vendor	YES
4	Electrical	LV MOTORS (NON FLAME PROOF)	LAXMI HYDRAULICS PVT. LTD	129/130, INDUSTRIAL ESTATE PATIL NAGAR, HOTGI ROAD SOLAPUR-413003, MAHARASHTRA	Sub vendor	YES
4	Electrical	LV MOTORS (NON FLAME PROOF)	MARATHON	MARATHON ELECTRIC INDIA PRIVATE LTD.SECTOR - 11, MODEL TOWN, FARIDABAD - 121006	Sub vendor	YES
5	Electrical	LV MOTORS (NON FLAME PROOF)	NGEF	POCKET NO.10, FLAT NO. 37 & 38, EXPANDABLE DDA FLATS, NASIRPUR DWARKA, PHASE-I NEW DELHI-110 045	Sub vendor	YES
5	Electrical	LV MOTORS (NON FLAME PROOF)	RAJINDRA ELECT INDUSTRIES	14 SHAH IND.ESTATE VEERA DESAI RD,ANDHERI(W) MUMBAI-400053	Sub vendor	YES
6	Electrical	LV MOTORS (NON FLAME PROOF)	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	Sub vendor	YES
6	Electrical	LV MOTORS (FLAME PROOF)	RAJINDRA ELECT INDUSTRIES	14 SHAH IND.ESTATE VEERA DESAI RD,ANDHERI(W) MUMBAI-400053	Sub vendor	YES
7	Electrical	JUNCTION BOXES (NON FLAME PROOF)	JASPER ENGNIREES PVT. LTD.	A-23, SECTOR - 8, NOIDA-201301	Sub vendor	YES
7	Electrical	JUNCTION BOXES (NON FLAME PROOF)	Electro Controls & Devices	M/S ELECTRO CONTROLS & DEVICES, F-41, SITE-C, SURAJPUR INDUSTRIAL AREA GREATER NOIDA, UTTAR PRADESH :201308	Sub vendor	YES
8	Electrical	JUNCTION BOXES (NON FLAME PROOF)	M/s Shrenik & Co.	39A/3, PANCHRATNA INDUSTRIAL ESTATE, SARKHEJ-BAVLA ROAD, CHANGODAR, AHMEDABAD – 382 213	Sub vendor	YES
8	Electrical	JUNCTION BOXES (NON FLAME PROOF)	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	Sub vendor	YES
9	Electrical	JUNCTION BOXES (NON FLAME PROOF)	Adroit Control Engineers Pvt.Ltd.	M/S ADROIT CONTROL ENGINEERS PVT.LTD. PLOT-3, KRISHNA INDL. AREA, SECTOR-25 FARIDABAD – 121004	Sub vendor	YES
9	Electrical	JUNCTION BOXES (NON FLAME PROOF)	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	Sub vendor	YES
10	Electrical	JUNCTION BOXES (NON FLAME PROOF)	MIKA ENGINEERS	BRANCH OFFICE : 'D'-101, DHEERAJ HERITAGE RESIDENCY II, SHASTRI NAGAR, SANTACRUZ (W), MUMBAI 400 054.	Sub vendor	YES

10	Electrical	JUNCTION BOXES (NON FLAME PROOF)	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	Sub vendor	YES
11	Electrical	JUNCTION BOXES (NON FLAME PROOF)	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI – 110049	Sub vendor	YES
11	Electrical	JUNCTION BOXES (NON FLAME PROOF)	AJMERA INDUSTRIES & ENGG. WORKS	AJMERA INDL. AND ENGG. WORKS. AJMERA HOUSE, A-61 / KHAIRANE MIDC. , TTC INDL. AREA, NAVI MUMBAI – 400705.	Sub vendor	YES
12	Electrical	JUNCTION BOXES (NON FLAME PROOF)	S.B. ELECTRICAL ENGINEERING CORPORATION	03, SARDAR GRIHA BUILDING, LOHAR CHAWAL, MUMBAI-400002	Sub vendor	YES
12	Electrical	JUNCTION BOXES (FLAME PROOF)	SUDHIR SWITCHGEAR	305/6, APEEJAY HOUSE, 130, BOMBAY SAMACHAR MARG, MUMBAI - 400 023. INDIA	Sub vendor	YES
13	Electrical	CABLE TRAYS & ACC.	ADVANCE POWER PRODUCTS	Mr. Manmohan Damani 24A, Rabindra Sarani, Kolkata-West Bengal-INDIA Phone- 033-22252463 Pincode : 700073 Email : advancepowerproducts@vsnl.net	PMD	YES
13	Electrical	CABLE TRAYS & ACC.	EROS METAL WORKS (P) LTD.	Mr. Amit N. Pande G-5, MIDC Industrial area Hingna Road Nagpur-Maharashtra-India Phone- 9371490163 Pincode : 440028 Email : emwpl_ngp@sancharnet.in	PMD	YES
14	Electrical	CABLE TRAYS & ACC.	INDUSTRIAL PERFORATION (I) PVT.LTD.	MR. A. K. SAHA 327, R.N.GUHA ROAD, DUM DUM KOLKATA-West Bengal-India Phone- 9830241788 Pincode : 700028 Email : ipipl@cal2.vsnl.net.in	PMD	YES
14	Electrical	CABLE TRAYS & ACC.	INDIANA GRATINGS PVT. LTD.	Sri D. M. Bhatia, M.D. Indiana House, Makeana Road, Marol Naka, Andheri (East), MUMBAI-MAHARASHTRA-INDIA Phone- 02228504743 Pincode : 400059 Email : dhanji.bhimani@indianagroup.com	PMD	YES
15	Electrical	CABLE TRAYS & ACC.	INDIA ELECTRICALS SYNDICATE	Mr. Suresh Kumar Agarwal 55, Ezra Street, Kolkata-West Bengal-India Phone- 033-22354047 Pincode : 700001 Email : cabletray@vsnl.com	PMD	YES
15	Electrical	CABLE TRAYS & ACC.	INDMARK FORMTECH PVT. LTD.	Mr. Narendra R. Meher J Block, Plot No.-375, MIDC BHOSARI PUNE-MAHARASHTRA-INDIA Phone- 020-27130546 Pincode : 411026 Email : indmarkformtech@vsnl.net	PMD	YES
16	Electrical	CABLE TRAYS & ACC.	Maheshwari Electrical Mfrs. Pvt. Ltd.,	A-59, Sector-5, Noida,-UP,-India, Phone- 9811027324, Pincode : 201301, Email : memindia@gmail.com,	PMD	YES
16	Electrical	CABLE TRAYS & ACC.	NAMDHARI INDUSTRIAL TRADERS PVT. LTD	Mr. Gurdeep Singh 515/5, Industrial Area-B, Overlock Road, Ludhiana-Punjab-India Phone- 0161-2531398 Pincode : 141003 Email : namdhari_ind_traders@yahoo.com	PMD	YES
17	Electrical	CABLE TRAYS & ACC.	PREMIER POWER PRODUCTS (CAL) PVT. LTD.	Chatterjee International Centre, 33A, Jawaharlal Nehru Road, 6th Floor, Suit No. - 11A, Kolkata,-West Bengal-India Phone- 9331008739 Pincode : 700071 Email : hemantdaga@dagaventures.com	PMD	YES
17	Electrical	CABLE TRAYS & ACC.	PATNY SYSTEMS (P) LTD	PATNY PLAZA 160 , SARDAR PATEL ROAD SEUNDRABAD SECUNDRABAD-TELANGANA-INDIA Phone- 040-27902451 Pincode : 500003 Email : mr.mkt@patnysystems.com	PMD	YES
18	Electrical	CABLE TRAYS & ACC.	PARMAR METALS PVT.LTD.	MR. KIRIT PARMAR 28-A, BHAKTINAGAR INDL ESTATE RAJKOT-GUJARAT-INDIA Phone- 9925019998 Pincode : 360 002 Email : info@parmarmetal.com	PMD	YES
18	Electrical	CABLE TRAYS & ACC.	PASSIVE INFRA PROJECTS PVT. LTD.	MR. VARUN AGRAWAL 182, VAISHALI, PITAMPURA Delhi-DELHI-INDIA Phone-9871183059 Pincode : 110088 Email : ATANU.SAHA@PASSIVEINFRA.COM	PMD	YES
19	Electrical	CABLE TRAYS & ACC.	PENTAX FERRO INCORPORATE	Mr. Rajeev Kandhari 801, 8th Floor, Palm Springs, Link road, Malad (W) Mumbai-Maharashtra-India Phone- 09820088400 Pincode : 400064 Email : rajeev@jencogalva.com	PMD	YES

19	Electrical	CABLE TRAYS & ACC.	RUKMANI ELECTRICAL & COMPONENTS PVT LTD	11A , MAHARISHI DEBENDRA ROAD 1ST FL , ROOM NO.4 KOLKATA-WEST BENGAL-INDIA Phone- Pincode : 700007 Email : maruthikabra@gmail.com	PMD	YES
20	Electrical	CABLE TRAYS & ACC.	RATAN PROJECTS & ENGINEERING CO. PVT.LTD.	MR. G.D. SINGHEE/MR. MAHESH SINGHEE 26, P.K. TAGORE STREET, MAIN BUILDING KOLKATA-WEST BENGAL-INDIA Phone- 9830177331 Pincode : 700006 Email : mahesh@ratans.com	PMD	YES
20	Electrical	CABLE TRAYS & ACC.	RABI ENGINEERING WORKS PVT. LTD.	MR. TAPAN KUMAR SEN/MR. SIDDHARTHA 327, R.N. GUHA ROAD, DUM DUM, KOLKATA-WEST BENGAL-INDIA Phone- 9748753002 Pincode : 700028 Email : rabiengineering@gmail.com	PMD	YES
21	Electrical	CABLE TRAYS & ACC.	Saral Industries	Mr. Y.K. Gupta L-1, L-2, Industrial Area-1 Sultanpur Road Rae Bareli-Uttar Pradesh-India Phone- 0535-2702474 Pincode : 229010 Email : saralindustries@gmail.com	PMD	YES
21	Electrical	CABLE TRAYS & ACC.	UNITECH FABRICATORS and ENGINEERS PVT LTD	INDRAPRASHTHA APARTMENT 24 , M.B.RAOD , BIRATI KALABAGAN KOLKATA KOLKATA-WEST BENGAL-INDIA Phone- Pincode : 700051 Email : ufepl@vsnl.net; ufepl@rediffmail.com	PMD	YES
22	Electrical	CABLE TRAYS & ACC.	VINFAB ENGINEERS INDIA PVT. LTD.	Mr. Vinay Deepak Kandhari 510-Sanjar Enclave, S.V. Road, Opp. Milad Cinema,Kandivali (West), Mumbai-Maharashtra-India Phone- 09833513350 Pincode : 400067 Email : vinay.kandhari@vkindia.com	PMD	YES
22	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	EROS INFRASTRUCTURES PVT. LTD.	Mr. Amit Pande MIDC Industrial Area, Butibori, G-97, Nagpur-Maharashtra-India Phone- 0712-3205305 Pincode : 441103 Email : amitp@erosgroup.co.in	PMD	YES
23	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	INDUSTRIAL PERFORATION (I) PVT.LTD.	MR. A. K. SAHA 327, R.N.GUHA ROAD, DUM DUM KOLKATA-West Bengal-India Phone- 9830241788 Pincode : 700028 Email : ipipl@cal2.vsnl.net.in	PMD	YES
23	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	INDMARK FORMTECH PVT. LTD.	Mr. Narendra R. Meher J Block, Plot No.-375, MIDC BHOSARI PUNE-MAHARASHTRA-INDIA Phone- 020-27130546 Pincode : 411026 Email : indmarkformtech@vsnl.net	PMD	YES
24	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	JAGANNATHAN ENGINEERING WORKS	Mr. S. Narayanan SF NO 22/2A-3G, Attikudi Village Vengur Post, Thiruverumbur Trichy-Tamil Nadu-India Phone- 0431-2404012 Pincode : 620013 Email : jewengg7@gmail.com	PMD	YES
24	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	PREMIER POWER PRODUCTS (CAL) PVT. LTD.	Chatterjee International Centre, 33A, Jawaharlal Nehru Road, 6th Floor, Suit No. - 11A, Kolkata,-West Bengal-India Phone- 9331008739 Pincode : 700071 Email : hemantdaga@dagaventures.com	PMD	YES
25	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	PATNY SYSTEMS (P) LTD	PATNY PLAZA 160 , SARDAR PATEL ROAD SEUNDRABAD SECUNDRABAD-TELANGANA-INDIA Phone- 040-27902451 Pincode : 500003 Email : mr.mkt@patnysystems.com	PMD	YES
25	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	RUKMANI ELECTRICAL & COMPONENTS PVT LTD	11A , MAHARISHI DEBENDRA ROAD 1ST FL , ROOM NO.4 KOLKATA-WEST BENGAL-INDIA Phone- Pincode : 700007 Email : maruthikabra@gmail.com	PMD	YES
26	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	RATAN PROJECTS & ENGINEERING CO. PVT.LTD.	MR. G.D. SINGHEE/MR. MAHESH SINGHEE 26, P.K. TAGORE STREET, MAIN BUILDING KOLKATA-WEST BENGAL-INDIA Phone- 9830177331 Pincode : 700006 Email : mahesh@ratans.com	PMD	YES
26	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	RABI ENGINEERING WORKS PVT. LTD.	MR. TAPAN KUMAR SEN/MR. SIDDHARTHA 327, R.N. GUHA ROAD, DUM DUM, KOLKATA-WEST BENGAL-INDIA Phone- 9748753002 Pincode : 700028 Email : rabiengineering@gmail.com	PMD	YES
27	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	Saral Industries	Mr. Y.K. Gupta L-1, L-2, Industrial Area-1 Sultanpur Road Rae Bareli-Uttar Pradesh-India Phone- 0535-2702474 Pincode : 229010 Email : saralindustries@gmail.com	PMD	YES

27	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	TJSV Steel Fabrication & Galvanizing (India) Limited	Mr. N. Sreekumar Vasavanaickenpatti, Kondampatti Post, Gudimangalam, No. 83, Udumalpet,-Tamil Nadu-India Phone-0425-2249481 Pincode : 642201 Email : nsreekumar1949@gmail.com	PMD	YES
28	Electrical	CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	UNITECH FABRICATORS and ENGINEERS PVT LTD	INDRAPRASHTHA APARTMENT 24 , M.B.RAOD , BIRATI KALABAGAN KOLKATA KOLKATA-WEST BENGAL-INDIA Phone- Pincode : 700051 Email : ufepl@vsnl.net; ufepl@rediffmail.com	PMD	YES
28	Electrical	CABLE GLANDS	ALLIED TRADERS & EXPORTERS	C-124 A, SECTOR-2, NOIDA -201 301, UTTAR PRADESH, INDIA	Sub vendor	YES
29	Electrical	CABLE GLANDS	ARUP ENGG & FOUNDARY WORKS	391/119,PRINCE ANWAR SHAH ROAD, CALCUTTA-700068	Sub vendor	YES
29	Electrical	CABLE GLANDS	BALIGA LIGHTING EQPT.PVT.LTD.	63A,CP RAMASWAMY ROAD, ALWARPET,P.B.No 6910, CHENNAI-600018	Sub vendor	YES
30	Electrical	CABLE GLANDS	COMMET BRASS PRODUCTS	NUTAN CHEMICAL COMPOUND, WALBHAT ROAD, GOREGAON, MUMBAI-400063	Sub vendor	YES
30	Electrical	CABLE GLANDS	DOWELLS	M/S. DOWELLS ELECTRICALS 47/47A, SATGURU INDUSTRIAL ESTATE. OFF AAREY ROAD, GOREGOAN (EAST). MUMBAI 400 063.	Sub vendor	YES
31	Electrical	CABLE GLANDS	ELECTROMAC INDUSTRIES	27/28AF NEW EMPIRE IND.ESTT., R.KRISHNA MANDIR RD.JB NGR ,ANDHERI(E),MUMBAI-400059	Sub vendor	YES
31	Electrical	CABLE GLANDS	INCAB	HARE STREET,KOLKATA,WEST BENGAL-700001	Sub vendor	YES
32	Electrical	CABLE LUGS	DOWELLS	M/S. DOWELLS ELECTRICALS 47/47A, SATGURU INDUSTRIAL ESTATE. OFF AAREY ROAD, GOREGOAN (EAST). MUMBAI 400 063.	Sub vendor	YES
32	Electrical	CABLE LUGS	UNIVERSAL MACHINES LTD.	4,B.B.D.BAG (EAST) 90,STEPHEN HOUSE,5TH FLR CALCUTTA-700001	Sub vendor	YES
33	Electrical	GI CONDUITS	BIS APPROVED MAKE		Sub vendor	YES

एनटीपीसी NTPC	PROJECT :Patratu STPP (2X660 MW) PACAKGE :EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2	LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL	REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017

Sl. No.	ITEM	QP / INS CAT.	QP No:- 9578-001-QVE-	QP SUB. SCH.	QP APPL SCHEDULE	SUB-SUPPLIERS	PLACE	SUB-SUPPLIER APPL. STATUS AS PER NTPC	SC APPL SCHEDULE	REMARKS
5.	Battery charger (110V/220V) @ subject to sub-QR clearance	1	4			M/s Amararaja	Tirupati	A@		
						M/s HBL- Power System	Hyderabad	A@		
						M/s Chhabi electrical	Jalgaon	A@		
						M/s. Chloride Power	Kolkatta	A@		
						M/s Statcon	Hapur	A@		Approved Up to 220, V 850 A subject to Sub-QR clearance, higher rating in DR
						M/s Dubas	Bangalore	A@		Approved upto 220 V, 850 A subject to Sub-QR clearance , higher rating in DR
						M/s Saft Nife Power Systems	Singapore	A@		
						Massteck	Jalgaon	A@		
						Emerson Network	Thane	DR@		
						Jema Energy	Spain	DR@		
6.	Battery (Ni-Cd)	1	5			M/S HBL-Power System	Hyderabad	A @		Up to 990 Ah with conditions(Pocket plate type)
						M/S Amcosaft	Bangalore	A @		8Ah to 990Ah- KPH type 10Ah to 1365 Ah- KPM type 11Ah to 1550Ah – KPL type (Pocket plate type)
						Hoppekke	Germany	A@		
						Exide	Kolkata	DR@		
7.	Battery Plante	1	6			M/s Exide	Kolkata	A@		
						Hoppekke	Germany	DR@		

Bharat Heavy Electricals Limited PS-MKTG Delhi

Patratu Vidyut Utpadan Nigam Limited C & M Deptt. Dist-Ramgarh(Jharkhand)

एनटीपीसी NTPC	PROJECT :Patratu STPP (2X660 MW) PACAKGE :EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2	LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL	REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017

Sl. No.	ITEM	QP / INS CAT.	QP No:- 9578-001-QVE-	QP SUB. SCH.	QP APPL. SCHEDULE	SUB-SUPPLIERS	PLACE	SUB-SUPPLIER APPL. STATUS AS PER NTPC	SC APPL SCHEDULE	REMARKS
8.	Battery Health Monitoring System	I	7			Elteek	Gurgaon	DR		
						Emerson	Mumbai	DR		
						Hitachi Hirel	Gandhinagar	DR		
						HBL Power System	Hyderabad	A		
						Statcon	Hapur	DR		
						Hoppekke	Germany	DR		
9.	Fire Sealing System i) Type – A material supplier	III				M/s 3M India	Bangalore	A		
						M/s GE Silicon	USA	A		
						M/s Dow Corning	USA	A		
	ii) Type – B Material supplier	III				M/s Lloyds	Delhi	A		
						M/s Signum	Nagpur	A		
						M/s Vijay System Engineers Pvt. Ltd.	Mumbai	A		
						M/s Multikil Fire	Vadodara	DR		
						Murugapa Morgan	Ranipet	DR		
						Unifrax India	AHMEDABAD	DR		
	iii) Execution Agency for above					Same as 9 (ii) & 3 M India	Same as 9 (ii) & 3 M India	A		
10.	GI cable trays, fitting	I				Inar Profiles Ltd	Enkapalli	A		

Bharat Heavy Electricals Limited PS-MKTG Delhi

Patratu Vidyut Utpadan Nigam Limited C & M Deptt. Distt-Ramgarh (Jharkhand)

एनटीपीसी NTPC	PROJECT :Patratu STPP (2X660 MW) PACAKGE :EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2	LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL	REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017

Sl. No.	ITEM	QP / INS CAT.	QP No:- 9578-001-QVE-	QP SUB. SCH.	QP APPL SCHEDULE	SUB-SUPPLIERS	PLACE	SUB-SUPPLIER APPL. STATUS AS PER NTPC	SCAPPL SCHEDULE	REMARKS
	& accessories including bends					Vatco	Mumbai	A		Galvanization at Sigma Mumbai
						Indiana cable trays	Mumbai	A		Galvanization at Karamtara galvaniser
						Industrial Perforation	Kolkata	A		
						Ratan Engineering	Kolkata	A		Galvanization at B.P. Projects
						India Electric Syndicate	Kolkata	A		Galvanization at BMW Industries/B.P Projects
						Steelite engg.	Mumbai	A		
						Premier Power Products	Kolkata	A		Galvanising at Neha Galvaniser
						Indiana Gratings	Pune	A		Galvanization at Poona Galvanizer/ Anand Yeknow Aids Engg
						M.J. Engineering	Okhla/ Bhiwadi	A		
						Jamna Metal	Delhi/ Kundli	A		
						T.R.G	Chennai	A		Galvanization at TM Radhakrishna Chetty & Co
						Amtech	Pune	A		Galvanization at B.G. Shirke - Pune
						Kannade Anand Udyog	Mumbai	A		Fabrication at their units: Plot No. 42, Moriv District Thane & Plot No.: D-35 Anand Nagar MIDC, Addl. Ambernath , Dist.Thane Galvanization and offer the galvanized cable trays for inspection at D-34 Anand Nagar MIDC, Addl. Ambernath, Dist.Thane.
						Rukmani	Raipur	A		Ladder type cable trays only
						Passive Infra	Hasangarh (Rohtak)	A		
						Unitech Fabricators &	Howrah/	A		

Bharat Heavy Electricals Limited PS-MKTG Delhi

C & M Deptt.

एनटीपीसी NTPC	PROJECT : Patratu STPP (2X660 MW) PACAKGE : EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2	LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL	REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017

Sl. No.	ITEM	QP / INS CAT.	QP No:- 9578-001-QVE-	QP SUB. SCH.	QP APPL SCHEDULE	SUB-SUPPLIERS	PLACE	SUB-SUPPLIER APPL. STATUS AS PER NTPC	SC AP PL SC HE DU LE	REMARKS
						Engineers	Hoogly (Kolkata)			
						Patny System	Hyderabad	A		Galvanisation at Gurpreet galvaniser - Hyderabad
						Rabi Engg	Kolkata	A		Galvanizing from NTPC approved sources
						Advance Power Products	Howrah	A		
						Mahenwari Electricals	Noida	DR		
						Saral Industries	Raibareli	DR		
						Parmar Metal	Rajkot	DR		
						Pentax	Mumbai	DR		
						Eros metal	Nagpur	DR		
						Vinfab	Thane	DR		
						Namdhari	Ludhiana	DR		
						Indmark Formtech	PUNE	DR		
11.	Cable tray flexible support system (GI)	I	9			Vatco	Mumbai	A		Galvanising at Sigma Mumbai
						Inar profiles	Enkapalli	A		
						Industrial perforations	Kolkata	A		
						Premier power products	Kolkata	A		Galvanising at Neha Galvaniser
						Steelite engg.	Mumbai	A		
						Indiana gratings	Pune	A		Galvanising at Poona Galvaniser
						Amtech	Pune	A		Galvanising at B.G. Shirke
						Ratan Projects	Kolkata	A		Galvanization at NTPC approved sources
						Indmark Formtech	PUNE	DR		
12.	Lead coated steel flexible conduits	II				M/s PLICA	Ghaziabad	A		
						M/s Lapp	Germany	DR		
						M/s Bansal Labs	Bhopal	A		

Bharat Heavy Electricals Limited * PS-MKTG Delhi

C & M Deptt. * Patratu Vidyut Utpadan Nigam Limited * Distt-Ramgarh (Jharkhand) *

एनटीपीसी NTPC	PROJECT :Patratu STPP (2X660 MW) PACAKGE :EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2	LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL	REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017

Sl. No.	ITEM	QP / INS CAT.	QP No:- 9578-001-QVE-	QP SUB. SCH.	QP APPL. SCHEDULE	SUB-SUPPLIERS	PLACE	SUB-SUPPLIER APPL. STATUS AS PER NTPC	SCAPPL SCHEDULE	REMARKS
13.	Junction boxes / Link Boxes/ Test Link Box/ Adopter box, Switch Boxes, Pull Boxes (Hot Dip Galvanized)	III				Main contractor approved sources with galvanization from NTPC approved sources (Note-2)		Noted		
14.	FRP Junction boxes	II	10			Main Contractor approved sources		Noted		
15.	Cable termination kits & straight through jointing kit upto 33KV	I	11			M/s 3M Electro & Communication	Pune	A		up to 33 KV
						Raychem	Mumbai	A		Heat shrinkable type up to 33 KV
						Yamuna Cable Accessories	Yamunanagar	DR		
						Hari Consolidated Pvt Ltd	Delhi	A		Heat shrinkable type Upto 11 KV with conditions, above rating DR
16.	Cable glands	III				Main contractor approved sources		Noted		
17.	Cable lugs	III				M/s Dowell	Mumbai	A		
						M/s Billets Elektro Werke Ltd.	Umbergaon	A		

Bharat Heavy Electricals Limited PS-MKTG Delhi

Patratu Vidyut Utpadan Nigam Limited Distt-Ramgarh(Jharkhand) C & M Deptt.

NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 06
	CONTRACTOR : BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVI-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		II				Forbes Aros	Pune	A				Approved up to 4" and 300 Class. "DR" for Higher rating and Size.
		*				Daume Regelarmaturen GmbH	Germany	DR				M/s BHEL will forward only three proposals after details review of NTPC Technical specification requirements.
		*				Metso Singapore PTE ltd.	South Korea	DR				
		*				Severn Glocon	Chennai	DR				
		*				Spx Corporation	USA	DR				
		*				Rings Valvulas SL	Spain	DR				
		*				Valvitalia SPA	Italy	DR				
		*				R K Controls	Thane	DR				
		*				Circor (Leslie)	Coimbatore	DR				
		*				Spx Flow Technologies	USA	DR				
		*				Circor (Leslie)	Coimbatore	DR				
		*				Scheejang valve co. ltd.	China	DR				
		*				Spx Flow Technologies	Ahamadabad	DR				
		*				WEIR Valves and Controls	UK	DR				
		*				WALDEMAR FRUSS ARMATURENFABRIK GMBH	Germany	DR				
		*				BOMAFA Special valve solutions Pvt. Ltd.	Ahmedabad	DR				
		*				Suzhou delan enfeny science and tehnology co., Ltd.	China	DR				
22	Temperature Transmitter	III				EMERSON	U.S.A/Pawano / Singapore	A			Sub QR	
	(Single and Dual Input)	III				Yokogawa	Japan	A				Final testing at M/S YIL,Bangalore is also acceptable
		III				Moore	USA	A				
		III				M System	JAPAN	A				
		III				ABB	GERMANY/ Bangalore	A				
		III				ENDRESS & HOUSER	Aurangabad	A				
		*				Khrone		DR				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		*				Tokyo Keiso	Japan	DR				
		*				Honeywell	Pune	DR				
		*				IFOM	Sweden	DR				
		*				JP & F	Bangalore	DR				
		*				Siemens		DR				
		*				Yamatake	JAPAN	DR				
		*				Yamari	JAPAN	DR				
		*				Foxboro		DR				
23	Conduits/Pipe(GI)					Refer Electrical List						
24	Electronic transmitters (pressure, DP,Flow)	III				EMERSON (Rosemount)	USA/ Pawano	A			Sub QR	
		III				FUJI ELECTRIC	France	A				
		III				YOKOGAWA	JAPAN	A				Testing and Calibration at M/s YIL, Bangalore is also acceptable.

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NTPC	PROJECT : Patratu STPS Phase-I (3 X 800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9583-091-2		

No.	Major Equipment	QP Inspection Category	QP No. 9583-091-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				YOKOGAWA	Bangalore	A				E.M- E series 110,430,530
		III				ABB	Bangalore	A				Model - 2600 T
		III				Altb	GERMANY / Italy	A				Model - 2600 T
		III				Siemens	France / Kalwa	A				
		III				Honeywell	Pune	A				
		III				Laxson Automation	Daman	A				SMAR Make
		III				Baldota	Mumbai	A				SMAR Make
		*				ENDRESS & HOUSER	Aurangabad/ Germany	DR				
		*				CHINO	Ghaziabad	DR				
25	Thermocouples, RTD & Thermowell	III				HERAUS SENSOR	GERMANY	A			Sub QR	
		III				WISE Control	Korea	A				
		II				Tempsens	Udaipur	A				
		II				Pyrpelectric	Goa	A				
		II				Delmo Instrumentation & Electronics Ltd	Mumbai	A				
		III				Minco	USA	A				
		III				OKAZAKI corporation	JAPAN	A				
		III				Yamari	JAPAN	A				
		III				Yamari	Singapore	A				For RTD Reference list and Performance feedback is to be submitted.
		III				ABB(SENSYCON)	Germany	A				
		III				EMERSON (Rosemount)	Germany	A				
		II				EMERSON (Roesmount)	Pawane	A				Imported from Emerson, Germany (make)
		II				Thermal Instruments(DEC)	Savantwadi	A				
		II				Techno Instruments	Ahamadabad	A				
		II				GOA Instrument Industries	GOA	A				For Thermowell only
		*				GOA Instrument Industries	GOA	DR				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		*				WIKA	Pune	DR				
		*				Techniwel Industries	Ajmer	DR				
		*				E & H	Aurangabad	DR				
		*				Nesstech	Vapi	DR				
		*				Instrustial Instruments	Kolkata	DR				
		*				Exotherm	Thane	DR				
		*				Baumer Technologies	Vapi	DR				
		*				Fisend Engineering	Noida	DR				
		*				Siemens India	Gurgaon	DR				
		II				Jindal Electronics	Rourkee	A				For Generator turbine & Motor
26	Ultrasonic type level Transmitter	III				E & H	Aurangabad/ Germany	A			Sub QR	
		III				EMERSON	Pawane	A				
		III				SIEMENS MILTRONICS	CANADA	A				
		III				Nivelco	Hungary	A				
		*				Vega	Germany	DR				

NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				Khrone	France / USA / Pune	DR				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		*				Yokogawa	Bangalore	DR				
		*				P&F	Germany	DR				
		*				Magnetrol	Belgium	DR				
		*				ABB	Germany / India	DR				
		*				Fobes Marshall	Pune	DR			Sub QR	
27	Orifice plate assembly	III				Instrumentation Limited	Palghat	A				
		III				Micropressions	Palwal	A				
		III				Stalmech	Pune	A				
		III				Flow Star	Faridabad	A				
		III				SEIKO	Austria	A				
		III				MINCO India Pvt. Ltd.	GOA	A				Up to 32"
		III				MINCO India Flow Elements Pvt. Ltd.	GOA	A				Up to 28"
		III				WISE Control	Korea	A				
		III				T M Technomatic	Italy	A				
		*				IEPL	Hyderabad	DR				
		*				Engg. Specialties	Kolkata	DR				
		*				BALIGA	CHENNAI	DR				
		*				Pyrostatic	Mumbai	DR				
		*				Hydropneumatics	Mapusa	DR				
		*				Tonsa Equipment Pvt. LTd	Thane	DR				
		*				Dynamic Fluid Vales Pvt. Ltd.	Belgaum	DR				
28	Pressure, DP Gauge	III				BUDENBERG	UK	A				
		III				ASHCROFT	USA/Germany/ India	A				
		III				Wika	GERMANY	A				
		III				WISE Control	Korea	A				
		III				Nagano KEIKI	Japan	A				
		III				H Guru South India	Bangalore	A				Not for MS & FW application
		III				A.N. Instruments	Kolkata	A				Not for MS & FW application
		III				Gauge Bourdon	Panvel	A				
		III				Goa Thermostatic	GOA	A				Not for MS & FW application
		III				Wika	Pune	A				DR for MS & FW application
		III				Baumer	Vapi	A				DR for MS & FW application
		III				Precision mass products Pvt. Ltd.	Gandhinagar	A				Not for MS & FW application
		III				H Guru	Rishra/Muzaffarpur	A				Not for MS & FW application
		*				US Gauge	USA	DR				
		*				Winters	USA	DR				
		III				Forbes Marshall	Hyderabad	A				
		*				Manometer	Mumbai	DR*				
		III				Walchandnagar Industries Ltd.	Dharwad	A				
		III				Nesstech	Vapi	A				DP Gauge for M/s Nesstech, Japan
		*				Gauges Bourdon	UK	DR				
		*				Fisher Mesa	Germany	DR				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 05
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 25.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVI-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				Protech Control	Kolkata	DR				
		*				New Scientific	Kolkata	DR				
		*				PTCI	Kolkata	DR				
28	Level gauge (Transparent & Reflex, Tubular type)	III				Main Contractor approved Sources		A				
30	Press, DP, Vacuum Switch	III				SOR	USA	A			Sub QR	
		III				DRESSOR (ASHCROFT)	USA/Germany	A				
		III				ITT BARTON	USA	A				
		III				HERION	GERMANY	A				
		III				BARKEDALE	GERMANY	A				
		*		*		Nagano KEIKI	Japan	DR				
		II				Switzer Process Instrument	Chennai	A				Up to 40kg/cm2 & not for Compound Switch and except 900 series
		II				Trafag	Gurgaon	A				Up to 40kg/cm2 & not for Compound Switch
		II				Switzer Process Instrument	Ghaziabad	A				Up to 40kg/cm2 & not for Compound Switch
		III				Delta control	UK	A				
		I				Gauges Bourdon (GIC)	Panvel	A				Up to 40kg/cm2 & not for Compound Switch
		I				ASHCROFT	Gandhinagar	A				
		*				Wika	Pune	DR				
		III				Gergeon	France	A				
		III				United Electric	USA	A				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		*				SMC	Japan	DR				
		*				Neodyne	USA	DR				
		*				IMI NORGEN	Noida	DR				
		*				WISE Control	Korea	DR				
		*				Baumer	Vapi	DR				
		*				Vasu Tech	New Delhi	DR				
		III				Bott & Kirch	Germany	DR				
31	Temperature Switch	III				SOR	USA	A			Sub QR	
		III				DRESSOR (ASCHROFT)	USA/Germany	A				
		III				ITT BARTON	USA	A				
		III				DELTA CONTROLS	UK	A				
		I				Switzer Process Instrument	Chennai	A				up to 200 Deg. C
		I				Switzer Process Instrument	Ghaziabad	A				up to 200 Deg. C
		II				Trafag	Gurgaon	A				up to 200 Deg. C
		I				ASHCROFT	Gandhinagar	A				
		*				Wika	Pune	DR				
		III				Gergeon	France	A				
		III				United Electric	USA	A				
		*				SMC	Japan	DR				
32	Flow switch	III				UNIVERSAL FLOW METER	USA	A			Sub QR	
		III				Switzer	Chennai	A				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 08
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-8585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 8585-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				Levcon	Kolkata	A				
		III				DK Instrument	Kolkata	A				
		III				Khrone Marshal	Pune	A				
		III				Chemtrol	India	DR				
		III				V Automat	NewDelhi	DR				
		III				Gauges Bourdon	Panvel	A				
		III				Magnetrol	Belgium	A				
		III				Ashcroft	Germany	A				
		III				Austrol	UK	A				
		III				Merloid	USA	A				
		III				Delta Control	UK	A				
		III				Merlum	USA	A				
		*				Sunag Corperation		DR				
33	Condensing Pots	III				Main Contractor approved Sources		A				
34	Electric to Pneumatic converter	III				IMI NORGEN	India	A			Sub QR	Make : WATSON SMITH
		III				Fair child	USA	A				
		*				ABB	India	A				Subject to meeting the NTPC specification requirement
		*				SMC Pneumatics	Noida	DR				
		*				P & F	Bangalore	DR				
		*				Fairchild India Pvt. Ltd.	Noida	DR				
		*				FESTO	Bangalore	DR				
35	Conduits lead coated (Flexible)	III				Pilca	Ghaziabad	A				Main contractor can propose additional vendor for this item
		III				Bansal laboratories	BHOPAL	A				
36	Intelligent Battery charger 24V DC & DCDB /BHMS	II				Chabbi Electricals	Jalgaon	A			Sub QR	Modules from EMERSON
		II				Eltech	Gurgaon	A				Modules from ELTEK
		II				MasTech	Jalgaon	A				Modules from ELTEK
		II				Emerson	India	A				
		II				MasTech (Setek Modules)	Jalgaon	A				BHMS from M/s USV, Germany
		*				HBL Power Systems	India	DR				
		*				Dubas	India	DR				
		*				Chabbi Electricals (Chabbi Modules)	Jalgaon	DR				
		*				Hitachi Hi Rel	Gandhinagar	DR				
		*				Statcon Power Controls Pvt. Ltd.	Noida	DR				
		*				Chloride Power Systems (caldyne)	India	DR				
		*				Amararaja	Tirupati	DR				
		*				Keltron Power Electronics	Trivendram	DR				

M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACT :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-9565-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9565-001-QVI-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				Universal instrument manufacturing co P Ltd	India	DR				
		*				Hind Rectifier Ltd	India	DR				
37	Battery Health Monitoring System	III				Emerson	Mumbai	A				
		III				Elek SGS Pvt Ltd	Gurgaon	A				
		*				IB Tech Inc	USA	DR				
		III				Hitachi Hi Rel	Gandhinagar	A				
		*				Hopeckee	Germany	DR				
		*				Hitachi Hi Rel	Gandhinagar	DR				
38	Battery(Ni-cd)	I				AMCO SAFT	Bangalore	A				
		II				SAFT	France/Sweeden	A				
		I				HBL POWER	Hyderabad	A				
		II				Hopekee	Germany	A				
39	Socket weld fittings	III				BHEL Approved Sources						
40	Impulse pips & tubes	II				Mahrashtra Seamless	Raigarh	A				Carbon steel only
		II				Sumitomo/Kawasaki/Nippon	Japan	A				
		II				TPS TECHNITUBE	Germany	A				
		II				Vellunc & mannesmann	Germany	A				
		II				BHEL	Trichy	A				
		II				Trinoday and Cauvin	France	A				Makes shall be as per approved list (Sr. No. 41)
		II				ISMT	Ahamadnagar	A				Carbon steel only.
		II				Sandvik		A				For SS only.
		*				TUBACES	Spain	DR				
		*				Salzgitter Mannesmann International	Germany	DR				
		*				Jindal saw	India	DR				
		II				Ratanamani Metal and Tubes	Ahamadabad	A				SS only
		II				Heavy metals and Tubes	Ahamadabad	A				SS and CS only.
		*				Shubhlaxmi Metal and Tubes	Mumbai	DR				
41	Compression fittings	III				Parker	USA	A				
		III				Precision	Mumbai	A				
		III				Astech	Mumbai	A				
		III				Fluid control Pvt. Ltd.	Pune	A				
		III				HP Valves and fittings	CHENNAI	A				Ferrulees are to be hardned at Exim Holand for pressure above 9000 psi.
		III				Excel hydro	Mumbai	A				Ferrulees are to be hardned at Exim Holand for pressure above 9000 psi.
		III				Swagelock	USA	A				
		III				Parsam	Mumbai	A				
		III				Metpress	Kolkata	DR				
		*				AURA INC	New Delhi	DR				
		*				Prima Engineers		DR				
		*				Arya Craft		DR				

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NTPC		PROJECT : Patratu STPS Phase-I (3 X800MW)					LIST OF ITEMS REQUIRING QP					
		PACKAGE : EPC PACKAGE					APPROVAL & ACCEPTABLE			REVISION NO : 09		
		CONTRACTOR :BHEL Ltd					VENDOR AS APPROVED BY			DATE : 28.04.2017		
		CONTRACT NO : CS-9585-001-2										
No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVI-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				PMT Engineers	Ahemdabad	DR				
		*				Flowtech	Kolkata	DR				
		*				Parker Hannfin India Pvt Ltd		DR				
42	Instrument valves	III				BHEL	Trichy	A				
		II				Excel Hydro	Mumbai	A				
		II				Instrumentation Ltd.,	Palghat	A				
		III				Swagelok	USA	A				
		III				Parker	USA	A				
		II				HP Valves and fittings	CHENNAI	A				
		II				Fluid control Pvt. Ltd.	Pune	A				
		II				Baldota	Mumbai	A				
43	Valve manifolds	III				Excel hydro	Mumbai	A				
		III				SCHNEIDER	Germany	A				
		III				Anderson Greenwood	USA	A				
		III				Astech	Mumbai	A				
		III				HP Valves and fittings	CHENNAI	A				
		III				Fluid control Pvt. Ltd.	Pune	A				
		III				Microprecision	Faridabad	A				
		III				Parker	USA	A				
		III				Swagelok	USA	A				
		III				Baldota	Mumbai	A				
		*				Metpress Engg. works	Kolkata	DR				
		*				Flow tech	Kolkata	DR				
44	Local Instrument Enclosure/Rack	I				Pyrotech	Udaipur	A				
		I				Instrumentation Limited	Kota	A				
		I				Sajas electrical	Tiruchirapalli	A				
		I				Prammen	Puddukottai	A				
		I				Chemin	Pondicherry	A				
		*				Forbes Marshall	Pune	DR				
		*				Psaltronics	Vadodara	DR				
		*				Procon	Chennai	DR				
45	Instrument Cables	I				Paramount	Khushkhera	A				PVC,FRLS type,RQP
		I				Polycab	Daman	A				PVC,FRLS type,RQP
		I				Delton	Faridabad	A				PVC,FRLS type,RQP
		I				KEI	Bhiwadi	A				PVC,FRLS type
		I				Elkay Telelinks	Faridabad	A				PVC,FRLS type
		I				CORDS	Chopanki	A				PVC,FRLS type,RQP
		I				CORDS	Kaharani	A				PVC,FRLS type,RQP
		I				Nicco	Kolkata	A				PVC,FRLS type
		II				TEW & C	USA	A				
		II				Habia cables	Sweeden	A				
		II				Kerpen cables	Germany	A				
		II				Lapp cables	Germany	A				
		II				Thermo electra Bv	Netherland	A				
		I				Universal Cable	Satna	A				PVC,FRLS type
		I				Thermocables	Hyderabad	A				PVC,FRLS type

NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVP-0	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		I				Finolex Cable	Pune	OR *				
		I				Incab	Pune	OR *				
		I				Gupta Power Infrastructure Ltd.	Khurdha	A				
		*				Lapp cables	India	OR				
		*				Lioni cable	Pune	OR				
		*				RR Kabel	Silvasa	OR				
		*				Gemscab	Bhiwadi	OR				
		*				KEC International	Mysore	OR				
		*				Advance cable Technologies	Bangalore	OR				
		*				Sayog Electricals Ltd.	Vadodara	OR				
		*				Special Cable	India	OR				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		*				CMI	Faridabad	OR				
		*				Govind Cables	Kolkata	OR				
		*				Associate Cables	Mumbai	OR				
		*				Radiant RSCC Specialty	Hyderabad	OR				
		*				APAR Industries	Banglore	OR				
		*				Tempsens Cable	Udaipur	OR				
		*				Mansfield cables co. Ltd.	Hyderabad	OR				
		*				Servel India Pvt. Ltd.	Neemrana	OR				
		*				TC Communication Pvt. Ltd.	Ghaziabad	OR				
45	Electrical actuator	III				Auma	Germany	A				
		III				Limitorque	USA	A				
		III				Rotork	UK	A				
		II				Limitorque	Faridabad	A				
		II				Rotork	Chennai/ Bangalore	A				
		III				Nippon gear	Japan	A				
		II				Auma	Bangalore	A				
		III				Harold Beck	USA	A				
		III				Orehmo	Germany	A				
		I				Aviteb	Chennai	A				For Low torque application such as SH/RH vent, circulation isolation
		*				Lindoe	USA	OR				
		*				Siemens	Germany	OR				
47	Electrical actuator for ID/FD/PA blade pitch and Gaide vane control	III				Harold Beck	USA	A				
		III				BIPOS Aktorik GmbH	Germany	A				
		*				ABB	Germany	OR				
48	Flow nozzle / Venturi assembly	II				Micropreclsion	Faridabad	A			Sub QR	
		II				SEIKO	Austria	A				
		II				TECHNOMATIC	Italy	A				
		II				Instrumentation Limited	Palghat	A				
		I				Starmech	Pune	A				
		II				WISE Control	Korea	A				

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C & M Dept. Patratu Vidyut Utpadan Nigam Limited Distt-Ramgarh(Jharkhand)

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 05
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		I				MINCO India Flow Elements Pvt. Ltd.	GOA	A				
		*				SAMIL	Korea	DR				
		*				MINCO	GOA	DR				
		*				Engg. Specialties	Kolkata	DR				
		*				Pyroelectric	Mumbai	DR				
		*				Hydropneumatics	Mapusa / GOA	DR				
		*				ASIAN INDUSTRIAL VALVES	Chennai	DR				
		*				Dynafluid valves Pvt. Ltd.	Belgium	DR				
49	HIGH Temp. cable (PTFE/FEP)	II				Habia cables	Swedom	A				
		II				Lapp cables	Germany	A				
		II				Kargan cables	Germany	A				
		II				TEW & C	USA	A				
		II				Thermo-Electra Bv	Netherland	A				
		II				Habia cables	China	A				
		II				Thermocables	Hyderabad	A				
		II				Tempsens	Udaipur	A				
		*				Delton Cables	Faridabad	DR				
		*				RJ Cables	Roorkee	DR				
50	Fiber optic cable	II				HFCL	Goa	A				
		II				R&M	Switzerland	A				
		II				Aksh Fibre	Bhiwadi	A				
		II				Finolex	Pune/Goa	A				
		II				Birla Ericsson	Rewa	A				
		II				Molex	UK	A				
		II				Corning	USA	A				
		II				Schneider	GOA	A				Previously known as D Link / Smartlink, Goa
		*				RPG Cables	India	DR				
		*				Unilex Cables	India	DR				
		*				Terracom	India	DR				
51	Pneumatic Actuator (Power Cylinder e. g. FOR SADC)	II				Dong Woo Valve Control Co. LTD	Korea	A				
		II				Shin Hwa Engineering Co. LTD	Korea	A				
		I				Instrumentation Limited	Palghat	A				
		I				Kelton	Cochin(Alleppy)	A				
		I				SMC Pneumatics	Noida	A				Up to 12 inch only
		I				Rotex	Mumbai	A				Conditional
		*				Emerson Process Management	Chennai	DR				
		*				MIL Controls	Alwaye	DR				
		*				Festo	Bangalore	DR				
		*				IMI Norgen	Noida	DR				
52	Level switch capacitance type	III				ENDRESS & HOUSER	Aurangabad	A			Sub QR	
		III				MAGNETROL	BELGIUM	A				
		III				SBEM	PUNE	A				
		III				PUNE TECHTROL	PUNE	A				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				LEVCON	KOLKATA	A				
		III				Nivo Controls	Indore	A				
		*				V AUTOMAT	New Delhi	DR				
		*				D K Instrument	Kolkata	DR				
		*				Siemens	Germany	DR				
		*				ABB	Korea	DR				
		*				Rosemount	Korea	DR				
53	Transducer	II				AE	Mumbai	A				
		II				Southern Transducer	Chennai	A				
		II				Elster	Mumbai	A				
		III				Camille Bauer	Germany	A				
		III				Metrawat	Germany	A				
		II				Rishab	Nasik	A				
		*				Pyrotech	Udaipur	DR				
		*				Masibus	Gandhinagar	DR				
		*				SIEMENS	Germany	DR				
54	Mini UPS up to 2.5 KVA	III				EMERSON	Mumbai	A				
		III				EMERSON	Pune	A				
		III				Hitachi Hi- Rel	Gandhinagar	A				
		III				APC	Bangalore	A				
		III				APLAB	Mumbai	A				
		III				Delta	Gurgaon	A				
		*				Powerbronix	Bangalore	DR				
		*				OUBAS ENGG.PVT.LTD., BANGALORE		DR				
		*				Grid power conversion Pvt Ltd.		DR				
		*				Schneider	Bangalore	DR				
55	Level switch- cond type	III				EMERSON (Solartron mobrey)	UK	A			Sub QR	
		II				Hi Tech	Kolkata	A				Levelstate, UK System
		III				Yarway	USA	A				
		III				LEVELSTATE	UK	A				
		II				Ramgir Instruments	Delhi	A				Emerson (Mobrey) System
		*				BHEL	Trichy	DR				
		*				KIEMA	Germany	DR				
56	Level switch - Float/Displacer Type	III				ENDRESS & HOUSER	AURANGABAD	A			Sub QR	
		III				MAGNETROL	BELGIUM	A				
		III				LEVCON	KOLKATA	A				
		III				SIEM	PUNE	A				
		III				Chemtrols samil	Mubmai	A				
		III				HAKATIYA	JAPAN	A				
		III				Sigma Industries	Mubmai	A				
		III				D K Instrument	KOLKATA	A				
		III				PUNE TECHTROL	PUNE	A				
		III				V AUTOMAT	NEW DELHI	A				
		*				WAREE	WAPI	DR				
		III				LEVELSTATE	UK	A				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR : BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				Gauges Bourdon (GIC)	Panvel	A				
		*				Nisan Scientific Process	Navi Mumbai	DR				
57	Air filter regulator	III				Fairchild	USA	A				
		III				Shavo Norgen	Mumbai	A				
		III				SMC Pneumatics	NOIDA	A				
		III				Emerson (Asco)	Chennai	A				
		III				Festo	Bangalore	A				
		III				Placka	Chennai	A				
						Divya Control Elements	Gujarat	DR				
58	Copper tubing/Brass connectors	III				Main Contractor approved Sources		A				
59	Coupling / Interposing relays	III				PARAMOUNT	BANGALORE	A				
		III				OMRON		A				
		III				OEN		A				
		III				Jyoti	Baroda	A				
		III				ELSTA	SWITZERLAND	A				
		*				Schneider	Germany	DR				
		*				Siemens	Germany	DR				
		*				Phoenix	Germany	DR				
		*				Finder		DR				
60	Solenoid valve	III				Rotex	Vadodara	A			Sub QR	
		III				Avcon	Mumabi	A				
		III				Herion	Germany	A				
		III				IMI NORGEN	GERMANY	A				
		III				Jefferson	Argentina	A				
		III				Asco	Chennai/USA	A				
		III				Festo	Bangalore	A				
		III				SMC	Noida	A				
		III				Parker	Brand Name	A				
		*				Schneider	Germany	DR				
		*				Neuron Industries Pvt. Ltd.		DR				
61	Lube oil control valve - Self Regulating	III				NUOVO PIGNONE	ITALY	A				
		III				EMERSON	CHENNAI	A				
		III				SAMSON	GERMANY / PUNE	A				
		III				Forbes marshall arca pvt. Ltd.	Pune	A				Approved up to 16", 900 Class.
62	Guided wave/Radar type level transmitter	III				Magnetrol	Belgium	A			Sub QR	
		III				Endress & Houser	Germany/ Aurangabad	A				
		III				Emerson Process Management	Sweden/ PAWANE	A				
		III				ABB(K-Tech)	USA	A				
		II				Supreme Technology	Thane	A				Make M/s Siemens, Canada
		*				Yokogawa	Japan	DR				
		*				ABB	India	DR				
		*				P & F	Bangalore	DR				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR : BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9585-001 .2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QP	Remark
		*				Krohne	France	DR				
		*				HONEYWELL	Pune	DR				
		*				Vega	Germany / India	DR				
		*				Siemens	India	DR				
		*				SBEM	Pune	DR				
63	Maintenance and Calibration Equipment					Main Contractor will propose the vendors during detail Engineering.						
64	Temperature Gauge	III				SUDENBERG	UK	A				
		III				ORESSOR (ASHCROFT)	USA/Germany	A				
		III				Wika	GERMANY/ Pune	A				
		III				WISE Control	Korea	A				
		III				Nagano KEIKI	Japan	A				
		III				H.Guru South India	Bangalore	A				
		III				A.N. Instruments	Kolkatta	A				
		III				NUOVA FIMA	ITALY	A				
		III				Goa Thermostatic	Goa	A				
		III				Goa Instrument Industries	Goa	A				
		III				Baumer	Vapi	A				
		III				Precision mass products Pvt. Ltd.	Gandhinagar	A				
		III				H Guru	Rishra/Muzaffarpur	A				
		III				Baumer	Vapi	A				
		III				Forbes Marshall	Hyderabad	A				
		III				Gauges Bourdon (GIC)	Panvel	A				
		*				Konica	Korea	DR				
		*				Pyrosiectric	GOA	DR				M/s BHEL will forward only two proposals after details review of NTPC Technical specification requirements.
		*				Winters Gauge	USA	DR				
		*				Walchandnagar Industries Ltd.	Dharwad	DR				
		III				Nesstech	Vapi	A				
		*				US Gauge	USA	DR				
65	Furniture for computer (Chair, Almirah, Lock etc.)	III				Main contractor approved sources		A				
66	Terminal Block (Cage and Clamp type)	III				Weidmuller	Germany	A				
		III				Phoenix	Germany / India	A				
		III				Wago	Germany / India	A				
		III				Elmex	Vadodara	A				CE Mark only
67	FRP Junction Box for C&I system	III				BHEL Approved Sources		A				
68	PLC System (If applicable)	I				GE Intelligent platforms	Bangalore	A				
		I				ABB	Bangalore	A				
		I				Schneider	Nasik	A				
		I				Rockwell	Sahibabad	A				
		I				Siemens	Nasik	A				
		I				HONEYWELL	Pune	A				
69	SMART POSITIONER (Make)	#				ABB						# - To be moved in Control Valve QP.

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		#				Mastleman						
		#				Siemens						
		#				Smar						
		#				Yokogawa						
		#				EMERSON (Fisher Rosemount)						
		#				METSO						
		#				Yamatake						
		#				Moore						
70	ROTAMETER	III				IEPL	HYDRABAD	A			Sub QR	
		III				TRAC	HYDRABAD	A				
		III				PLACRA	CHENNAI	A				
		III				EUREKA	PUNE	A				
		III				SCIENTIFIC DEVICES	MUMBAI	A				UP TO 300 NB
		III				FLOW STAR	FARIDABAD	A				
		III				TOKOYO KEISO	JAPAN	A				
		+				Flowtech Instrument Services	Vadodara	OR				
		+				Samil Chemtrol	MUMBAI	OR				
		+				Gauges Bourdon	Panvel	OR				
		+				Tensa Equipment Pvt. Ltd.	Thane	OR				
71	SINGLE AND MULTI POINT TEMPERATURE RECORDER (Microprocessor based)	III				YOKOGAWA INDIA	BANGALORE	A				Make Yokogawa, Japan
		III				CHINO CORPORATION	JAPAN	A				
		III				EUROTHERM	UK	A				
		III				EUROTHERM	INDIA	OR				
		III				YOKOGAWA	JAPAN	A				
		III				ABB	UK / GERMANY	A				
		III				FUJI	JAPAN	A				
		III				HONEYWELL	USA / NETHERLAND	A				
72	Reverse Rotation Indicator (RRI)	III				GE BENTLY NEVEDA	USA	A			Sub QR	ALL TSI VENDORS ARE ALSO ACCEPTABLE
		III				SHINKAWA	JAPAN	A				
		I				P & F	Bangalore	A				
73	Instrument Tube Fittings (Air)	III				Main contractor approved sources		A				
74	pH/ Conductivity Analyser	III				IMCH	Switzerland / USA	A			Sub QR	
		III				YOKOGAWA	Banglaore / Japan	A				Make Yokogawa- Japan
		III				ABB	UK / USA	A				
		III				EMERSON	Pawane	A				
		+				Thermo orion		OR				
		+				Forbes Marshall	Pune	OR				
75	PADO					Main Contractor will propose the vendors during detail Engineering.						
76	DEW Point Sensor / meter/ Moisture Measuring System	III				GE Sensing	USA / Imland	A				Panametric brand
		III				Michell Instrument	UK	A				
		III				Shaw	UK	A				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVESION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9595-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9595-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				COSA XENTAUR	USA	A				through Spectrum automation faridabad
		*				VAISHALA	Sweden / Japan	DR				
		*				OWER	USA	DR				
		*				Endee	Mumbai	DR				
		*				Nivo Controls	Indore	DR				
		*				Bartec GMBH	Germany	DR				
77	Blank Panels / Cabinets	III				Rittal	Bangalore	A				
		III				Hoffman	BANGALORE	A				
		III				Pyrotech	Udaipur	A				
		III				BHEL	Bangalore	A				
		III				Schneider	Bangalore	DR				
78	CCTV Components (IP)	*				Sony	Japan	DR				
		*				Siemens	Pondichery	DR				
	Integrators will be decided during detail Engineering.	*				Dv Tel	USA	DR				
		*				Honey Well	Gurgaon	DR				
		II				Bosch	Bangalore	A				With Bosch Software
		II				Axis	Sweden	A				With Bosch Software
		*				Pelco	USA	DR				
		II				Axis	Sweden	A				With Milestone Software
79	Control Desk, Server / PC Rack for Unit Control room and Auxiliary control room.	I				Pyrotech works Space	Udaipur	A				
		I				Cosmos	Noida	A				
		I				Adarsh Control	Bangalore	A				
		*				Chemin Controls	Pondichery	DR				
		*				Harmoney Systems	New Delhi	DR				
80	Digital Indicators	III				Masibus	Gandhi Nagar	A				For Non mosaic mounting
		III				ABB	Germany	A				
		III				Foxboro	UK	A				
		III				Yokogawa	Japan	A				
		III				Gossen / Metrowatt / Camille Bauer	Germany	A				
		III				Siemens	Germany	A				
		III				Chino	Japan	A				
		III				Weigell Messgerate	Germany	A				
		III				Pyrotech	Udaipur	A				For Non mosaic mounting
		*				Chino Corporation	Mumbai	DR				For Non mosaic mounting and submit only two proposals
		*				Yokogawa	Bangalore	DR				
		*				Lektronik	Pune	DR				
		*				Telecherm	Chennai	DR				
81	Dust Emision Monitor	III				Land Instrument Internasonal	UK	A				Land Combustion Division
		III				Durag	Germany	A				
		III				Sick Mathak	Germany	A				
		III				Emerson Process Management	Ireland	A				
		III				Codel	UK	A				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		II				Forbes Marshall	Pune	A				Main kit from M/s Codel, UK
82	Electrical Indicating Instruments (Mimic Compatible)	III				Siemens	Germany	A				
		III				Gossen / Metrawatt / Camille Bauer	Germany	A				
		III				Gang	Germany	A				
		III				Weigell Messgerate	Germany	A				
83	Flue Gas Analyser (CO)	III				Codel	UK	A			Sub QR	
		III				Emerson Process Management	Pawane	A				Analyser from M/s Emerson, Germany / USA
		III				Land Instrument International	UK	A				Land Combustion Div
		III				Sick Maihak	Germany	A				
		III				Siemens	Germany	A				
84	Flue Gas Analyser (CO2)	*				Codel	UK	DR			Sub QR	
		*				Sick Maihak	Germany	DR				
		*				Kittiwake Procal Ltd.		DR				
85	Flue Gas Analyser (SO2 and Nox)	III				Sick Maihak	Germany	A			Sub QR	
		III				Emerson Process Management	Pawane	A				Analyser from M/s Emerson, Germany / USA
		III				Siemens	Germany	A				
		III				Fuji Electric	Japan	A				
		*				Yokogawa	Japan	DR				
		*				Codel	UK	DR				
		*				ABB	Gloucestershire	DR				
86	Flue Gas Analyser (O2 Analyser (HT))	II				SECO	Chennai	A			Sub QR	Main Contractor Can propose additional vendor for this item
		III				Marathon Monitor	USA	A				
87	Flue Gas Analyser (O2 Analyser (LT))	III				Emerson (Rosemount)	Pawane	A			Sub QR	Make EMERSON, USA
		III				Forbes Marshall	Pune	A				Make Enotec, Germany : Model Oxitec 3000 series
		III				ICE	Mumbai	A				Make Ametek, USA
		III				Yokogawa	Bangalore	A				Make Yokogawa, Japan
		III				ABB	Bangalore	A				Make ABB, UK
		*				AMETEK (P and AI division)	Singapore	DR				
		*				Enotec	Germany	DR				
		*				Fuji Electric	Japan	DR				
		*				Teledyne	USA	DR				
88	Flue Gas Analyser Panel	I				Chemtrol	Goa	A			Sub QR	
		I				Emerson Process Management	Navi Mumbai	A				
		I				Pyrotech	Udaipur	A				
		I				Analytical Instrument Company	Kota	A				Analyser from M/s Fuji, Japan
		I				Yokogawa	Bangalore	DR				
		I				Adage	Mumbai	A				
		*				Marvel Engg Company	Chennai	DR				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR : BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVI-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				Forbes Marshall Codel	Pune	DR				
						ICE(Asia) Private India	Mumbai	DR				
89	Graphic Interface Unit	III				Rockwell Automation		A				
		III				Digital Instruments and Control System (Preface)	Bangalore	A				Preface Brand
		III				Red Lion	USA	A				
		III				Schneider Electric		A				
90	Hand Held Calibrator	III				Main contractor approved sources		A				Compatible with the Transmitter to be Supplied & Subject to meeting NTPC specification requirement
91	Hart Management System	III				Yokogawa	India	A				
		III				Emerson Process Mgmt	USA / Singapore / India	A				
		III				P & F	Germany / Bangalore	A				
		III				MTL	Chennai	A				
		*				Stahl	Germany	DR				
92	Impact Head Type Flow Element	II				Detriech / Emerson	USA	A			Sub QR	
		II				Midwest	USA	A				
		II				Veris Inc	USA	A				
		*				TM Technomatic SPA	Italy	DR				
93	Isolator	III				Main contractor approved sources						
94	Master Slave Clock System	II				Hopf	Germany	A				
		I				Sertel	Chennai	A				
		II				Hathway	USA	A				
		II				Moser Baer AG	Switzerland	A				
		II				Mein Berg	Germany	A				
		I				Sands	Chennai	A				
		I				Masibus	Gandhinagar	A				
		*				Signals & System	Chennai	DR				
95	Mosaic Tiles / Console Items	III				Pro-Plan	Germany	A				Earlier Boyko Stay
		III				Tew	Germany	A				Earlier Subklew
96	Network Components	III				Main contractor approved sources						
98	Online Mercury Analyzer	III				Durag	Bangalore	A			Sub QR	Make Durag, Germany
		*				Malhak	Germany	DR				Main Contractor Can propose additional vendor for this item
		*				Thermo	USA	DR				
97	P A System (IP Based)	*				Commend	Austria	DR				
		*				Stentaphone Zenitel	Norway	DR				
		*				Armtel	Russia	DR				
		*				Industronic Industrie Electronic GmbH and Co. KG	Germany	DR				
		*				LARAON Engineers and Consultants Pvt. Ltd.	Gurgaon	DR				
		*				Alshan Technologies India Pvt. Ltd.	Bangalore	DR				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 05
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-9585-001-2		

Sln.	Major Equipment	QP Inspection Category	QP No. 9585-001-QVIG	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
98	Printer (Dot Matrix)	III				BHEL Approved Sources						Make
99	Printer (Inkjet)	III				BHEL Approved Sources						Make
100	Printer (Laser)	III				BHEL Approved Sources						Make
101	Semaphore Indicators	III				Subklew	Germany	A				
		III				K & N	Austria	A				
		III				ABB	Germany	A				
		III				Siemens	Germany	A				
102	Synchronising Relay	III				Siemens	Mumbai	A			Sub QR	
		III				Areva	Chennai	A				
		III				ABB	Bangalore	A				
103	Synchroscope	III				BHEL Approved Sources		A			Sub QR	
104	Ultrasonic Type Flow Meter (for Stack)	III				Maihak	Germany	A			Sub QR	
		III				Durag	Germany	A				
		III				Teledyne	USA	A				
		*				GE Sensing	USA	DR				
105	UPS / ACDB	I				EMERSON (DB Power)	Pune	A			Sub QR	Approved up to 105 kVA, 1Φ
		I				Merlin & Gerin	France	A				
		I				Qutur	Switzerland	A				
		I				AEG (Safi)	Germany	A				
		I				Hitachi Hirel	Gandhinagar	A				Approved up to 150 kVA, 1Φ
		I				Emerson (Tata Liberl)	Ambamath	A				Approved up to 150 kVA, 1Φ
		I				Fuji Electric	Japan	A				
		*				Kelltron	Kerala	DR				
		*				APC	India	DR				
		*				DUBAS ENGG.PVT.LTD., BANGALORE		DR				
		*				Grid power conversion Pvt Ltd.		DR				
106	Vibration Monitoring System for BOP	II / I				Shinkawa	Japan	A			Sub QR	
	Refer Note - 1	II / I				Bentley Nivada	USA	A				
		II / I				Vibrometer	Switzerland	A				
		II / I				Rockwell Automation	USA	A				
		II / I				SKF	USA	A				Refer Note - 1
		I				GE	Pune	A				GE Bently, USA make System
		I				Meggit	Bangalore	A				Vibrometer, Switzerland make System
		I				Forbes Marshall	Pune	A				Shinkawa, Japan make System
		I				Rockwell Automation	Sahibabad	A				
		*				Emerson	Mumbai	DR				
		*				Bursi and Kajer		DR				
		*				IRD Mechanalysis	Mumbai	DR				
107	Voltmeter	III				Rishabh	Nasik	A			Sub QR	
		III				AE	Mumbai	A				
		III				Yokogawa	Japan	A				
		*				MECO		DR				
108	Watthour Meters	III				L&T	Bangalore	A				

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NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-IQVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		III				Elster	Mumbai	A				
		III				Secure Meters	Udaipur	A				
		III				Yokogawa	Japan	A				
		III				GEC	UK	A				
		III				Schnieder Electric	India	DR				
		III				Landis + Gyr	Kolkata	DR				
109	Wireless Solution (Microwave Tower Communication)	III				D Link	Goa	A				
		III				Sheetal	Pune	A				
		III				Pyrotech	Udaipur	A				
		III				Arya Communications	New Delhi	A				
		*				Lotus Wireless	Vishakhapatnam	DR				
		*				Avirton	Israel	DR				
		*				Prudent Automation Pvt. Ltd.	Hyderabad	DR				
		*				AMG Systems Ltd.	UK	DR				
110	Large Video Screen (LED Based)	III				Delta	Gurgaon	A				
		III				Barco	Noida	A				
		III				Planer System	USA	A				
		*				Christie	USA	DR				
		*				Eyevis	Germany	DR				
111	CJC this (if applicable)					Main Contractor will propose the vendors during detail Engineering.						
112	3 D level Scanner for Solid Application	III				APM	ISRAIL	A				
113	Dust Sensor	III				BHEL Approved Sources		A				
114	Pulse jet Controller	III				Switching Circuit	Kolkata	A				
		III				Advance Concept	Kolkata	A				
		III				Control Devices	Kolkata	A				
		*				Vollcraft	Kolkata	DR				
		*				Micro System	Kolkata	DR				
115	Solid Mass Flow Meter	III				Schenk	Rainchi	A				
		III				Thermofisher (Ramsay)	Texas	A				
		III				Siemens Milltronics	Canada	A				
		III				Mutec	Germany	A				
		III				SWR	Germany	A				
116	Nucleonic Density meter	III				E & H	Aurangabad	A				
		III				Thermofisher Scientific	UK	A				
		*				Siemens	Germany	DR				
		*				EMERSON	USA	DR				
		*				GE Sensing	USA	DR				
		*				Berthold	Germany	DR				
117	Humidistat / Thermostat / Gyerstat / Airstat	III				BHEL Approved Sources		A			Sub QR	
118	Level Switch (RF Type)	II				EIP Enviro	Noida	A			Sub QR	
		II				FLOW STAR	Faridabad	A				
		II				Nivo Controls	Indore	A				
		*				BHEL		DR				

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Dy. Mgr. Deptt.

NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 26.04.2017
	CONTRACT NO : CS-9565-001-2		

Itm.	Major Equipment	QP Inspection Category	QP No. 9565-508-QVIQ	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
119	Turbine supervisory instruments along with vibration analysis system.	II				GE BENTLY	USA	A				
	Refer Note - 1	II				MEGGITT (VIBROMETER)	SWITZERLAND	A				
		II				SHINKAWA	JAPAN	A				
		I				GE	Pune	A				For GE Bently, USA System
		I				MEGGITT (VIBROMETER)	Bangalore	A				For Meggitt, Switzerland System
		I				Forbes Marshall	Pune	A				For Shinkawa, Japan system
		*				EMERSON	INDIA	DR				
		*				Brual and Kjaer		DR				
		*				Rockwell Automation	Sahibabad	DR				
		*				SKF	USA / India	DR				
		*				BHEL EDN	Bangalore	DR				
120	SWAS (Sampling Handling System and Dry Panel)	I				Emerson Process Management	Navi Mumbai	A			Sub QR	
		I				Forbes Marshall	Pune	A				
		I				Lowe	UK	A				
		I				ABB	Bangalore	A				Conditional
		I				Yokogawa	Bangalore	DR				
		I				Analyser Instrument Co. Ltd.	Kota	DR				
		I				Steam Equipment	Pune	A				
		*				Flow Line Instrument	Bangalore	DR				
		*				Instrumentation Limited	Kota	DR				
		*				Chemin Controls	Pondichary	DR				
121	SWAS Analyser (Chloride)	III				ABB	UK	A			Sub QR	
		III				Orion	USA	A				Orion Brand
		*				DKK	Japan	DR				
122	SWAS Analyser (Conductivity)	III				Hach	Switzerland	A			Sub QR	Polymetron Brand
		III				Emerson Process Management	Navi Mumbai	A				
		III				Yokogawa	Japan	A				
		III				ABB	UK	A				
		*				Honeywell	USA	DR				
		*				DKK	Japan	DR				
		*				Orion	USA	DR				
123	SWAS Analyser (Dissolved Oxygen)	III				Orion	USA	A			Sub QR	Orion Brand
		III				Hach	Switzerland	A				Polymetron Brand
		III				Emerson Process Management	USA	A				
		III				ABB	UK	A				
		*				Honeywell	USA	DR				
		*				DKK	Japan	DR				
124	SWAS Analyser (Hydrazine)	III				Hach	Switzerland	A			Sub QR	Polymetron Brand
		III				Orion	USA	A				Orion Brand
		III				ABB	UK	A				

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C&M Deptt. Patratu Thermal Power Station Limited Patratu-Distt-Ramgarh (Jharkhand)

NTPC	PROJECT : Patratu STPS Phase-I (3 X800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 25.04.2017
	CONTRACT NO : CS-9585-091-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-091-QVS-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
		*				DKK	Japan	DR				
		*				Rosemount Analytical Inc Irvine		DR				
125	SWAS Analyser (pH)	III				ABB	UK	A			Sub QR	
		III				Hach	Switzerland	A				Polymetron Brand
		III				Emerson Process Management	Navi Mumbai	A				
		III				Yokogawa	Japan	A				
		*				Honeywell	USA	DR				
		*				DKK	Japan	DR				
		*				Orion		DR				
126	SWAS Analyser (Phosphate)	III				Hach	USA	A			Sub QR	
		III				Hach	Switzerland	A				Polymetron Brand
		III				ABB	UK	A				
		*				DKK	Japan	DR				
		*				Orion	USA	DR				
		*				Rosemount Analytical Inc Irvine		DR				
127	SWAS Analyser (Silica)	III				Hach	USA	A			Sub QR	
		III				Hach	Switzerland	A				Polymetron Brand
		III				ABB	UK	A				
		*				DKK	Japan	DR				
		*				Orion	USA	DR				
		*				Rosemount Analytical Inc Irvine		DR				
128	SWAS Analyser (Sodium)	III				Hach	Switzerland	A			Sub QR	Polymetron Brand
		III				Orion	USA	A				Orion Brand
		III				ABB	UK	A				
		*				DKK	Japan	DR				
129	SWAS Analyser (Turbidity)	III				ABB	UK	A			Sub QR	
		III				Emerson	USA	A				
		III				WTW	Germany	A				
		III				E & H	Germany	A				
		*				DKK	Japan	DR				
130	Operator Testing Simulator					Main Contractor will propose the vendors during detail Engineering.						
131	Concentration Analyser					Main Contractor will propose the vendors during detail Engineering.						
132	Electromagnetic Flow Meter	II				Krohne Marshal	Pune	A			Sub QR	
		II				E & H	Aurangabad	A				
		II				Emerson	Pawane	A				
		III				Yokogawa	Japan / China	DR				Only Ref list and catalouges to be submitted.
		III				SIEMENS	Germany	DR				
133	Fiber Optic Generator End winding VMS	II				Vibro System INC	Canada	A				
		II				MC-Monitoring SA	Switzerland	A				Note-6
134	H2 Gas Analyser Cabinet	II				ABB	Bangalore	A				H2 Gas Analyser Germany
		II				Adage Automation	Mumbai	A				H2 Gas Analyser siemens Germany Model Calomat-6
		II				Yokogawa	Bangalore	A				H2 Gas Analyser from Yokogawa, Japan
		II				Siemens	India	A				H2 Gas Analysersiemens Germany

NTPC	PROJECT : Patratu STPS Phase-I (3 X 800MW)	LIST OF ITEMS REQUIRING QP	
	PACKAGE : EPC PACKAGE	APPROVAL & ACCEPTABLE	REVISION NO : 00
	CONTRACTOR :BHEL Ltd	VENDOR AS APPROVED BY	DATE : 28.04.2017
	CONTRACT NO : CS-9585-001-2		

No.	Major Equipment	QP Inspection Category	QP No. 9585-001-(2)VI-Q	QP Submission SCH	QP Approval SCH	Proposed Sub Supplier	Country	SS Approval Status	SS Detail Sub.SCH	SS Approval SCH	Sub QR	Remark
135	Sight Flow Indicator	III				BHEL Approved Sources		A				
136	Ammonia Analyser	"				Sick Maihak	Germany	DR				
		"				Emerson Process Management	Pawane	DR				
		"				Siemens	Germany	DR				
		"				Fuji Electric	Japan	DR				
		"				Thermofisher	Mumbai	DR				
		"				Yokogawa	Banglore	DR				
		"				Dongwoo Optron		DR				
137	AAQMS	I				Environment SA India Pvt. Ltd.	Bangalore	A			Sub QR	Analysers for Environment SA, France ; Multipoint Calibrator from M/s L N Industrial, Switzerland and Metrological Sensors from M/s LSI Lastam SRL, Italy.
		I				Chemtrols	GOA	A				Analysers for Teledyne API, USA; Metrological Sensors & SPM from M/s Metone Instruments, USA.
		I				Thermo Electron LLS India PVt. Ltd.	Mumbai	A				Analysers for M/s Thermoenvironmental Instruments Inc., USA & Metrological Sensors from M/s Metone Instruments, USA.
		"				Land Combustion	UK	DR				
		"				Thermofisher	India / USA	DR				
138	FGMS	"				SEPL	Pune	DR			Sub QR	
		"				AICPL	Kota	DR				
		"				Nevoo	Surat	DR				
		"				Thermofisher	Mumbai	DR				
		"				Themax	Pune	DR				
		"				Supreme Technology	Mumbai	DR				
139	RESIDUAL CHLORINE ANALYSER	III				E & H	GERMANY	A				
						EMERSON PROCESS	PAWANE	A				
						HACH	USA	A				
140	ORP ANALYZER	III				Emerson process	USA/Pawane	A				
						ABB	UK/USA	A				
						HACH	Switzerland	A				
						Yokogawa	Japan	A				
141	CL2 Leak detector	III				W&T	Germany	A				
142	Flame Scanner Cable	I				Thermocable	Hyderabad	A				
		I				Gellon cables	Faridabad	A				

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C&M Deptt.

BHEL-PEM SUB VENDOR LIST AS ON 4/5/2018

Sl No	Package Name	Supplier Name	Supplier Communication Address
1	Cold Junction Compensation Box (CJCB)	CREATIVE INSTRUMENTS & CONTROLS	NO-17/1 , 1ST FLOOR , 11TH CROSS 1ST K BLOCK , RAJAJINAGAR, BANGALORE-560010 Phone- Pincode : Email : crinstruments@gmail.com
2	CONTROL VALVE	FORBES MARSHALL ARCA PVT.LTD.	A-34/35 , MIDC ESTATE, H-BLOCK, PIMPRI, PUNE, Phone- 020-27442020, Pincode : 411018 Email : mnadgaundi@forbesmarshall.com
		INSTRUMENTATION LTD.	KANJIKODE WEST, PALALKKAD, PALAKKAD Phone- 2566127-130,2567128 Pincode : 678623 Email : icvldil@gmail.com;fa2@ilpgt.com
		Koso India Private Limited,	H 33 & 34, MIDC, Ambad, Nashik, Phone- 09650233433 Pincode : 422010, Email : jetmal.gour@koso.co.in
		BOMAFA SPECIAL VALVE SOLUTIONS PVT LTD	Mr. K.M. Anklesaria/ R. M. Anklesaria Plot No: 285/2, Panchratna Estate, Near Ramol Bridge, Vatva Ahmedabad Phone- 079-40083825 Pincode : 382445 Email : info@bomafa-india.com
		KSB MIL CONTROLS LTD.	Mr.Jacob Cherian/Mr.Geo Jolly Meladoor, Annamanada P.O. MALA, Thrissur Phone- 0480-2695700 Pincode : 680741 Email : biju.simon@ksb.com
		SUZHOU DELAN ENERGY SCIENCE & TECHNOLOGY CO., LTD.	No 566 Fangqiao Road Caohu Industrial Park, Xiangcheng Economic Development Zone, Suzhou Phone- 008618012776062 Pincode : 215143 Email : jeanielei@delan-valve.com
		Valvitalia S.P.A. ,	Mr. Salvatore Ruggeri Via Tortona 69, Rivanazzano (Pavia) Phone- +39-03839459875 Pincode : 27055 Email : dario.torluccio@valviatalia.com
		R.K.CONTROL INSTRUMENTS PVT. LTD.	PLOT NO.A-250, OPP.POLICE STATION, WAGLE INDUSTRIAL ESTATE, THANE Phone- 25820943/2331 Pincode : 400604 Email : rkcipl@vsnl.com ; rkcinpvt@bol.net.in
		Mascot Valves Pvt. Ltd.	166-167 GIDC Naroda Ahmedabad Phone- 0792282 1619 Pincode : 382330 Email : dom.sales@mascotvalves.com
		EMERSON PROCESS MANAGEMENT CHENNAI LIMITED	147, KARAPAKKAM VILLAGE, CHENNAI Phone- 23722184, 23716242 Pincode : 600096 Email : jatinder.singh@emerson.com
		DRESSER VALVE INDIA PVT. LTD	Mr. Raj Raman/Mr. Rajkumar Moria S.F. No: 608,Chettipalayam Road, Echanari Post, Coimbatore Phone- +91-98451 19085 Pincode : 641021 Email : Anoop.Ramachandran@ge.com
		WALDEMAR PRUSS ARMATURENFABRIK GMBH	Mr. Winfried Dremhel Schulenburgerlandstrasse 261, Hannover Phone- +49-511279260 Pincode : 30419 Email : dremhel@pruss.de; vogel@pruss.de
3	ELECTROMAGNETIC FLOW METER	Adept Fluidyne Pvt. Ltd.	Vinayak Gadre Plot No 4,S.No.17/1-B Kothrud Industrial Estate Pune Phone- 020 25464551 Pincode : 411038 Email : info@adeptfluidyne.com
		Electronet Equipments Pvt Ltd.	Plot No. 84, 85 & 86, Tiny Industrial Estate Kondhwa Budruk, Pune Phone- 020-2026932039 Pincode : 411048 Email : ho@eeplindia.com
		SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai, Phone- 9892230623, Pincode : 400 701, Email : sdbpl@vsnl.com
4	FLOW ELEMENT	MICRO PRECISION PRODUCTS PVT. LTD.	K.P. CHANDHOK/ATUL CHANDHOK 4, LINK ROAD, FARIDABAD Phone- 9810265688 Pincode : 121002 Email : pal@microa1.com
		STAR-MECH CONTROLS (I) PVT.LTD.	SUSHILLOTAM, SUSHILLOTAM, 29/3A/3, SASANE NAGAR, HADAPSAR, PUNE Phone- 02026970450 Pincode : 411028 Email : marketing@starmech.net
		INSTRUMENTATION LTD.	KANJIKODE WEST, PALALKKAD, PALAKKAD Phone- 2566127-130,2567128 Pincode : 678623 Email : icvldil@gmail.com;fa2@ilpgt.com
		TM TECNOMATIC SPA	MR. ANTONIO NOVIELLO/Mrs. Enrica Bazzocc VIA DELLE INDUSTRIE, 36 CREMONA Phone- 39037221574 Pincode : 26100 Email : info@tmtecnomatic.com
5	FLOW ELEMENT - NOZZLE	DYNAFLUID VALVES AND FLOW CONTROLS (P) LTD.	Mr. Yogish M. Kulkarni Plot # 23, Udyambag, Belgaum Phone- 0831-4210386 Pincode : 590008 Email : yogish@dyna-fluid.com
		HYDROPNEUMATICS PVT. LTD.	Mr. DM Bichu G/B, Hill Crown Apts., College Road Mapusa Phone- 0832-2360364 Pincode : 403507 Email : ajayrc@hydropneumatics.co.in
		MINCO (INDIA) FLOW ELEMENTS PVT. LTD.	Mr. Raghavendra M. Kulkarni D2-49/50, Tivim Industrial Estate, Karaswada Mapusa Phone- 0832-2257059 Pincode : 403526 Email : gicflowelement@giconindia.com
		STAR-MECH CONTROLS (I) PVT.LTD.	SUSHILLOTAM, SUSHILLOTAM, 29/3A/3, SASANE NAGAR, HADAPSAR, PUNE Phone- 02026970450 Pincode : 411028 Email : marketing@starmech.net
		INSTRUMENTATION LTD.	KANJIKODE WEST, PALALKKAD, PALAKKAD Phone- 2566127-130,2567128 Pincode : 678623 Email : icvldil@gmail.com;fa2@ilpgt.com
		MINCO (INDIA) PRIVATE LIMITED	D/35,TIVIM INDUSTRIAL ESTATE, KARASWADA, MAPUSA, Goa, Phone- 9320197825, Pincode : 403526, Email : santoshkumar@general-gauges.com,
		MICRO PRECISION PRODUCTS PVT. LTD.	K.P. CHANDHOK/ATUL CHANDHOK 4, LINK ROAD, FARIDABAD Phone- 9810265688 Pincode : 121002 Email : pal@microa1.com
	FLOW ELEMENT - ORIFICE	MICRO PRECISION PRODUCTS PVT. LTD.	K.P. CHANDHOK/ATUL CHANDHOK 4, LINK ROAD, FARIDABAD Phone- 9810265688 Pincode : 121002 Email : pal@microa1.com
		TANSA EQUIPMENTS PVT. LTD.	Mr. Vardhan Tamhankar, Unit No35/36/41,Om Anand Industrial Est. Mohanjee Sundarjee Road,Raghunath Nagar, Thane Phone- 022-25832323 Pincode : 400604 Email : tansaindia@gmail.com

6		SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai, Phone- 9892230623, Pincode : 400 701, Email : sdbpl@vsnl.com
		MINCO (INDIA) PRIVATE LIMITED	D/35,TIVIM INDUSTRIAL ESTATE, KARASWADA, MAPUSA, Goa, Phone- 9320197825, Pincode : 403526, Email : santoshkumar@general-gauges.com,
		CHEMTROLS INDUSTRIES PVT. LTD.	Mr. K. NANDAKUMAR AMAR HILL, SAKI VIHAR ROAD, POWAI, MUMBAI Phone- 022-67151261 Pincode : 400072 Email : manikandan@chemtrols.com
		STAR-MECH CONTROLS (I) PVT.LTD.	SUSHILLOTAM, SUSHILLOTAM, 29/3A/3, SASANE NAGAR, HADAPSAR, PUNE Phone- 02026970450 Pincode : 411028 Email : marketing@starmech.net
		INSTRUMENTATION LTD.	KANJIKODE WEST, PALALKKAD, PALAKKAD Phone- 2566127-130,2567128 Pincode : 678623 Email : icvldil@gmail.com;fa2@ilpgt.com
		HYDROPNEUMATICS PVT. LTD.	Mr. DM Bichu G/B, Hill Crown Apts., College Road Mapusa Phone- 0832-2360364 Pincode : 403507 Email : ajayrc@hydropneumatics.co.in
		Flow Star Engineering Pvt. Ltd.,	MR. KHALID AKHTAR/MR. TAPAN KUMAR JANA Plot No-7 F/2, Northern India Industrial 20/3, Mathura Road FARIDABAD Phone- 9818176380 Pincode : 121005 Email : khalid@flowstar.co.in
		INSTRUMENTATION ENGINEERS PVT LTD	SH.N.V.RAM GOPAL/MS. N.NIHARIKA PLOTS 1,2,3, PHASE-III, IDA, JEEDIMETLA HYDERABAD Phone- 9848407365 Pincode : 500055 Email : iedelhi@ieflowmeters.com
		MINCO (INDIA) FLOW ELEMENTS PVT. LTD.	Mr. Raghavendra M. Kulkarni D2-49/50, Tivim Industrial Estate, Karaswada Mapusa Phone- 0832-2257059 Pincode : 403526 Email : gicflowelement@giconindia.com
		DYNAFLUID VALVES AND FLOW CONTROLS (P) LTD.	Mr. Yogish M. Kulkarni Plot # 23, Udyambag, Belgaum Phone- 0831-4210386 Pincode : 590008 Email : yogish@dyna-fluid.com
7	INSTRUMENT FITTINGS	Perfect Instrumentation Control (India) Pvt. Ltd.	MD Hussain Shaikh/Shahanawaz Khan Gala No. 168, Loheki Chwal,216/ 218, Maulana Azad Rd. Nagpada Junction Mumbai Phone- 91-9324383121 Pincode : 400008 Email : shahanawaz.khan@perfectinstrumentation.com
		Comfit & Valve Pvt. Ltd.	Mr. Jeetu Jain/Mr. Vinay Sosa Survey No. 23/1, Part 2, Ahmedabad-Mehsana Highway Laxmipura, Nandasan Phone- 02764-267036/37 Pincode : 382705 Email : marketing@com-fit.com
		Arya Crafts & Engineering Pvt. Ltd.	Mr.Sanjay Brahman/Mr.Shyam Vazirani 102, Vora Industrial Estate No.4 Navghar, Vasai Road (E) Dist.Thane, Mumbai Phone- +91-250-2392246 Pincode : 401210 Email : arya@aryaengg.com
		HP VALVES & FITTINGS INDIA PVT. LTD.	S. Harichandran/P.S. Pandi B-11, Mugappair Industrial Estate, CHENNAI Phone- 044 26252537 Pincode : 600037 Email : sales@hpvalvesindia.com
		PRECISION ENGINEERING INDUSTRIES	K. SITARAM/ K. SRINIVAS 7,SIDHAPURA INDUSTRIAL ESTATE S.V. ROAD,GOREGAON(W) MUMBAI Phone- 022 42631700 Pincode : 400 062 Email : peiks@vsnl.com
		AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com
		FLUIDFIT ENGINEERS PVT. LTD.	Mr. Abbas Bhola Potia Building No. 2, Office No. 3,292, Bellasis Road,Mumbai Central (East) Mumbai Phone- 9920044113 Pincode : 400008 Email : ab@fluidfitengg.com
		VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com
		Fluid Controls Pvt. Ltd.	Sophie Y. Moochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com
		PANAM ENGINEERS	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,
8	INSTRUMENTS PIPE FITTINGS	VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com
		AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com
		PRECISION ENGINEERING INDUSTRIES	K. SITARAM/ K. SRINIVAS 7,SIDHAPURA INDUSTRIAL ESTATE S.V. ROAD,GOREGAON(W) MUMBAI Phone- 022 42631700 Pincode : 400 062 Email : peiks@vsnl.com
		Fluid Controls Pvt. Ltd.	Sophie Y. Moochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com
		VIKAS INDUSTRIAL PRODUCTS	S.R.SINGH/NAVEEN SINGH B - 2, SECTOR - 6, NOIDA Phone- +91-9810122070 Pincode : 201301 Email : naveensingh@vsnl.com
		Fluid Controls Pvt. Ltd.	Sophie Y. Moochhala/Mayur Rajput J.V.PATEL, I.T.I CMPD, B.MADHUKAR MARG, ELPHINSTONE ROADSTN.(WR), MUMBAI Phone- (022) 43338000 Pincode : 400013 Email : sales@fluidcontrols.com
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		AURA INCORPORATED	NIRAJ SHARAN/SUJIT KUMAR W-167A, GREATER KAILASH-II NEW DELHI Phone- 9810182430 Pincode : 110048 Email : niraj@aurainc.com

9	JUNCTION BOX	SUCHITRA INDUSTRIES	NO-2,OPP-27 AECS LAYOUT 2ND STG REJAMAHALVILAS EXTN 2ND STG BANGALORE Phone- Pincode : Email : suchitra.industriesblr@gmail.com
		K.S.INSTRUMENTS PVT.LTD.	S Raghavan No. 72, 3rd Main, 1st Stage Industrial Suburb, Yeshwanthpur Bangalore Phone- 9880385770 Pincode : 560022 Email : sales1@ksinstruments.net
		Shrenik & Company,	Mr. Mitesh Shah/Mr. Pulin Shah 39 A/3 ,Panchratna Industrial Estate, Sarkhej-Bavla Road Ahmedabad Phone- 9825024921 Pincode : 382213 Email : sales@pustron.com, pulin@sumip.com
		FLEXPRO ELECTRICALS PVT. LTD.	Mr. Dineshbhai Zaveri C-1/ 27&37, GIDC, Kabilpore, Navsari Phone- 02637-265140,265003 Pincode : 396424 Email : flexpro@flexproltd.com
		AJMERA INDUSTRIAL & ENGINEERING WORKS	JIGNESH MAHENDRA AJMERA DENA BANK BLDG.,SHREE NAGESH INDL. ESTATE,STATION ROAD, MUMBAI Phone- 022 67973578 Pincode : 400 088 Email : ajmera@ajmera.net, jmajmera@yahoo.com
10	LEVEL GAUGE	TOSHNIWAL BROTHERS PVT.LTD.	WORKS:TOSHNIWAL IND.PVT.LTD, INDUSTRIAL ESTATE MAKHUPURA, AJMER Phone- 441171 Pincode : 305002 Email : toshniwalprocess@gmail.com
		BLISS ANAND PVT. LTD.	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B , IMT MANESAR Gurgaon Phone- 0124-4366000 TO 9 Pincode : 122001 Email : sales@blissanand.com
		SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI Phone- +919821038162 Pincode : 400078 Email : sales@sigmainstruments.co.in
11	LEVEL SWITCH-CAPACITANCE TYPE	SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI Phone- +919821038162 Pincode : 400078 Email : sales@sigmainstruments.co.in
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		V. AUTOMAT & INTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDL.AREA, PH-1 NEW DELHI Phone- 9810005826 Pincode : 110 020 Email : sales@vautomat.com
		LEVCON INSTRUMENTS PVT. LTD.	Mr Shayak Gupta/Badal Jana Rajkamal', 7th floor, 13, Camac Street KOLKATA Phone- 0 33 2283 2766 Pincode : 700017 Email : b_jana@levcongroup.com
		Flow Star Engineering Pvt. Ltd.,	MR. KHALID AKHTAR/MR. TAPAN KUMAR JANA Plot No-7 F/2, Northern India Industrial 20/3, Mathura Road FARIDABAD Phone- 9818176380 Pincode : 121005 Email : khalid@flowstar.co.in
		Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com
		Baumer Technologies India Pvt. Ltd.	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com
12	LEVEL SWITCH-CONDUTIVITY TYPE	Sapcon Instrument Pvt Ltd.	131, PALSHIKAR COLONY Contact Person- Mr. Ashwin (9826080207) INDORE Phone- +91-731-4085751, Pincode : 452004 Email : sales@sapconinstruments.com
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		BLISS ANAND PVT. LTD.	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B , IMT MANESAR Gurgaon Phone- 0124-4366000 TO 9 Pincode : 122001 Email : sales@blissanand.com
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		HI-TECH SYSTEMS & SERVICES LTD.	Mr. Vikash Agrawal/Mr. Tarun Debnath 119, PARK STREET , KOLKATA Phone- 033-22290045 Pincode : 700016 Email : sandeep@hitech.in
		RAMAN INSTRUMENTS PVT.LTD.	Mr. N R Shenoy/Mr G B Vijh 8, First Floor.Plot : 160A Bait-Ush-Sharaf, 29th Road,Bandra(W) MUMBAI Phone- 09892331381 Pincode : 400050 Email : ramanbpl@vsnl.com
		SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI Phone- +919821038162 Pincode : 400078 Email : sales@sigmainstruments.co.in
		SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com,
	LEVEL SWITCH-FLOAT TYPE	SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com,
		Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com
		D.K. INSTRUMENTS PVT.LTD.	N.SIKDAR/ SUMIT SIKDAR 76/2,SELIMPUR RD DHAKURIA Kolkata Phone- 033-2415-1310. Pincode : 700031 Email : dkinst@vsnl.net
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		GENERAL INSTRUMENTS CONSORTIUM	Mr. Amarendra Kulkarni 194/195, Gopi Tank Road, Off. Pandurang Naik Marg, Mahim Mumbai Phone- 9323195251 Pincode : 400016 Email : amarendra@general-gauges.com
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		SBEM PVT. LTD.	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE, Phone- 912041030100 Pincode : 411009 Email : newdelhi@sbem.co.in
		SIGMA INSTRUMENTS CO.	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI Phone- +919821038162 Pincode : 400078 Email : sales@sigmainstruments.co.in
14	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	A.N. INSTRUMENTS PVT. LTD.	MARKETING DIVISION, 5th FLOOR, 59-B, CHOWRINGHEE ROAD, KOLKATA Phone- 24757784,22472509 Pincode : 700020 Email : anidel@bol.net.in
		H.GURU INDUSTRIES	Mr. G. D. Hazra/Mr. P. K. Mitra 10 B, HO-CHI-MINH SARANI, KOLKATA Phone- 033 2282 2463 / 1637 Pincode : 700071 Email : mguru@vsnl.net
		BOSE PANDA INSTRUMENTS PVT.LTD.	Mr. Partha Bose 44, Saheed Hemanta Kumar Bose, Sarani, Kolkata Phone- +91 33 2548 7220 Pincode : 700074 Email : parthabosebpi@gmail.com; bosepanda@vsnl.net
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		GAUGE BOURDON INDIA PVT. LTD.	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai, Phone- 011-41607463, Pincode : 400016, Email : gicdelhi@general-gauges.com,
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		Nesstech Instruments Private Limited	26/2, G Type, Global Industrial Park Near Nahuli Railway Crossing, Valvada Vapi Phone- 9920576002 Pincode : 396105 Email : sales@nesstech.co.in
15	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	SOR INC.	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com,
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		Barksdale GmbH, Germany	Michael Weileder Dorn Assenheimer, Strasse 27 Reichelsheim Phone- +91-9999107840 Pincode : D-61203 Email : msingh@barksdale.de
		GENERAL INSTRUMENTS CONSORTIUM	Mr. Amarendra Kulkarni 194/195, Gopi Tank Road, Off. Pandurang Naik Marg, Mahim Mumbai Phone- 9323195251 Pincode : 400016 Email : amarendra@general-gauges.com
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		Kaustubha Udyog,	S.No. 36/1/1, Sinhgad Road, Vadgaon Khurd, Near Lokmat Press, Pune, Phone- 020-24393577, Pincode : Email : pressure@vsnl.com,
16	ROTAMETER	INSTRUMENTATION ENGINEERS PVT LTD	SH.N.V.RAM GOPAL/MS. N.NIHARIKA PLOTS 1,2,3, PHASE-III, IDA, JEEDIMETLA HYDERABAD Phone- 9848407365 Pincode : 500055 Email : iedelhi@ieflowmeters.com
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		EUREKA INDUSTRIAL EQUIPMENTS PVT.LTD.	Mr V. K. Pandit/Mr Ashish Shaha 17-20, Royal chambers, Paud Road Pune Phone- 9370469466 Pincode : 411038 Email : sales@eurekaflow.com

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18	TEMP. ELEMENT	PYRO ELECTRIC INSTRUMENTS GOA PVT.LTD.	M. D. BICHU/R. M. BICHU G.B, HILL CROWN APARTMENTS, COLLEGE ROAD, MAPUSA Phone- 9326114601 Pincode : 403507 Email : priyanka.marketing@pyro-electric.in
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		Thermal Instrument India Pvt. Ltd.	Mr. Raghavendra M. Kulkarni 194/195, Gopi Tank Road Behind Citylight Cinema,Mahim Mumbai Phone- 09322664709 Pincode : 400016 Email : ramk@giconindia.com
		TOSHNIWAL INDUSTRIES PVT. LTD.,	Industrial Estate, Makhupura, Ajmer, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com,
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		GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	D2/5, Mapusa Industrial Estate, Mapusa, Goa, Phone- 09326054551, Pincode : 403507, Email : sumukh@goainstruments.com,
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		DRESSER INDUSTRIES INC.	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol Phone- 02764-233682 Pincode : 382729 Email : Nishit.patel@ashcroftindia.com
		INDFOS (INDIA) LIMITED	MR.L.C.VENKATRANGAN/MR.B.KANNAN New No.17, II Floor, Adwave Towers, Dr.Sevalia Shivaji Salai, T.Nagar Chennai Phone- +91 44 24353407 Pincode : 600017 Email : delhi@indfos.com

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21	TRANSMITTERS	ABB LIMITED	MR. RAJIV GOVIL 14, MATHURA ROAD, FARIDABAD Phone- 09971085678 Pincode : 121003 Email : vipin.swami@in.abb.com
		Pune Techtrol Pvt. Ltd.	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com
		V. AUTOMAT & INTRUMENTS (P) LTD.	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDL.AREA, PH-1 NEW DELHI Phone- 9810005826 Pincode : 110 020 Email : sales@vautomat.com
		Moore Industries International Inc.	Leonard.W. Moore/ Matt Moren 16650 Schoenborn St. North Hills Phone- +1 818 830 5548 Pincode : 91343 Email : mmoren@miinet.com
		PANAM ENGINEERS	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,
		TOSHNIWAL INDUSTRIES PVT. LTD.,	Industrial Estate, Makhupura, Ajmer, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com,
		Endress + Hauser (India) Pvt. Ltd.,	Mr. Prakash Vaghela 215-216, DLF Tower 'A', Jasola District Centre, New Delhi, Phone- 9717593001, Pincode : 110025, Email : prakash.vaghela@in.endress.com,
		YOKOGAWA INDIA LIMITED,	PLOT NO.96, ELECTRONICS CITY COMPLEX, HOSUR ROAD, BANGALORE, Phone- 080-41586000, Pincode : Email : uday.shankar@in.yokogawa.com,
		SBEM PVT. LTD.	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE, Phone- 912041030100 Pincode : 411009 Email : newdelhi@sbem.co.in
		Honeywell Automation India Limited	Mr. Ritwij Kulkarni 917, INTERNATIONAL TRADE TOWER, NEHRU PLACE, NEW DELHI Phone- 9890200584 Pincode : 110019 Email : rajesh.chaudhary@honeywell.com
		EMERSON PROCESS MANAGEMENT (INDIA) PVT.LTD.	Mr. Amit Paithankar/Vikram Raj Singh 206-210,BALARAMA BUILDING 2ND FLR. BANDRA EAST MUMBAI Phone- 9619121500 Pincode : 400051 Email : vikramraj.singh@emerson.com
		SMART INSTRUMENTS LTD, BRAZIL	Agents: Digital Electronic Ltd. 74/11 'C' Cross Road MIDC Andheri (East) MUMBAI Phone- 28208477 Pincode : 400093 Email : corp@delbby.rpgms.ems.vsnl.net.in
		SIEMENS LIMITED	Dr. Armin Bruck/Sandeep Mathur 130, Pandurang Budhkar Marg Worli Mumbai Phone- 0124 383 7377 Pincode : 400018 Email : ankit.varshney@siemens.com
		NIVO CONTROLS PVT. LTD.	Mr. Praveen Toshniwal 104-115, Electronic Complex, Indore Phone- 0731-4081305 Pincode : 452010 Email : sales@nivocontrols.com
22	ULTRASONIC FLOW METERS	Adept Fluidyne Pvt. Ltd.	Vinayak Gadre Plot No 4,S.No.17/1-B Kothrud Industrial Estate Pune Phone- 020 25464551 Pincode : 411038 Email : info@adeptfluidyne.com
		FLEXIM Flexible Industriemesstechnik GmbH	Boxberger Str., 4, Berlin Berlin Phone- 0049 30 93 66 76 60 Pincode : 12681 Email : info@flexim.de
		Rockwin Flowmeter India Pvt. Ltd.	B-24, Site-IV, Sahibabad Industrial Area Ghaziabad, Phone- 9810129687 Pincode : 201010, Email : amiya@rockwin.com
		FLASH FORGE PVT LTD	Mr. Gautam Makker, 503, 'A'-wing, Delphi, Orchard Avenue Road, Powai Mumbai Phone- 022-42784300 Pincode : 400076 Email : hemendrapatil@f-f.co.in
		Electronet Equipments Pvt Ltd.	Plot No. 84, 85 & 86, Tiny Industrial Estate Kondhwa Budruk, Pune Phone- 020-2026932039 Pincode : 411048 Email : ho@eeplindia.com
		NIVUS GMBH	Mr. Marcus Fischer Im Taele 2, D - 75031 Eppingen Phone- 00491712233770 Pincode : Email : carolin.schuster@nivus.com

Note:

1. The above sub-vendor list is tentative & reference only. However Sub-Vendor List is subject to BHEL/end user approval without any commercial/ delivery implication.
2. New Sub-Vendor if proposed by Vendor during contract stage shall subject to BHEL/ end user approval without any commercial/ delivery implication.

Notes:-

1. The sub vendor list above is indicative only and is subject to BHEL and customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.

2. The inspection category will be intimated after award of contract by BHEL/customer. However the same will be adhered by the bidder without any commercial and delivery implication to BHEL/ customer.

ANNEXURE III: FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES

The Bidder shall guarantee that the equipment offered shall meet the rating and performance requirements stipulated for various equipment covered in this specifications.

The guaranteed performance parameters furnished by the bidder in his offer, shall be without any tolerance values and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures.

The bidder shall demonstrate all the guarantees covered herein during demonstration test / PG test.

The various tests which are to be carried out during demonstration tests are listed in the specification. The guarantee tests shall be conducted by the bidder at site in presence of BHEL/ CUSTOMER. All costs associated with the tests shall be included in the bid price.

In case during demonstration test /PG test, it is found that the equipment/system has failed to meet the guarantees, the bidder shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the BHEL/ CUSTOMER and re-conduct the demonstration test(s) / PG test with BHEL/ CUSTOMER's consent.

Hydrogen Generation Plant

i. Capacity and discharge pressure of hydrogen gas compressors at its rated duty point shall be demonstrated and proved at site.
ii. Electrolyser & rectifier capacity and power consumption shall be demonstrated at site.
iii. Parallel operation of two streams shall be demonstrated at site. Purity level and moisture content of hydrogen shall be demonstrated at site.
iv. Hydrogen generation plant capacity (stream wise) shall be demonstrated at site.
v. Vibration level and noise level of hydrogen gas compressors shall be demonstrated at site.

ANNEXURE IV : DRAWING DOCUMENTS DISTRIBUTION PROCEDURE

S.No	Description of Drgs/Docs	No of Prints	No of CD ROMs/DVDs/Portable Hard Disk
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents		
	First submission and submission with major changes		
	▪ Layout (A0&A1 sizes)	4	-
	▪ Other Drawings/Documents (A0&A1 sizes)	2	-
	▪ P&ID (All sizes)	4	-
	a) Final drawings/documents (Directly to site)	6	2
	b) "As Built" Drawing/Documents (Directly to site)	6	2
	c) Analysis reports of Equipments / piping /structures components/system employing software packages as detailed in the specifications.	2	2
2	Erection Manual (Directly to site)	4 sets	2
3	Operation & Maintenance manual i) First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2
4	Plant Hand Book i) First Submission	1	1
5	Commissioning and Performance Test Procedure manual i) First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2

S.No	Description of Drgs/Docs	No of Prints	No of CD ROMs/DVDs/Portable Hard Disk
6	Performance and Functional Guarantee Test Report i) First Submission	2 sets	–
	ii) Approved Copies (Direct to Site)	4 sets	2
7	Project Completion Report (Directly to site)	6 sets	2
8	QA programme including Organisation for implementation and QA system manual(with revisions)	1	–
9	Vendor details in respect of proposed vendors including contractor's evaluation report.	2	–
10	Manufacturing QPs, Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc i) For review/comment	1	–
	ii) Approved final copies of Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc (Direct to Site)	4	2
11	Welding Manual, Heat Treatment Manuals, Storage & preservation manuals i) For review/comment	1 set	–
	ii) Approved copies (Direct to Site)	4 sets	2
12	QA Documentation Package for items / equipment manufactured and despatched to site	2 sets	2
13	QA Documentation Package for field activities on equipment/systems at site	2 sets	2

ANNEXURE V: PAINTING SPECIFICATION

1.00.00 **SPECIFICATION OF SURFACE PREPARATION & PAINTING**

1.01.00 Surface preparation methods and paint/primer materials shall be of the type specified herein. If the contractor desires to use any paint/primer materials other than that specified, specific approval shall be obtained by the contractor in writing from the employer for using the substitute material.

1.02.00 All paints shall be delivered to job site in manufacturers sealed containers. Each container shall be labelled by the manufacturer with the manufacturer's name, type of paint, batch number and colour.

1.03.00 Unless specified otherwise, paint shall not be applied to surfaces of insulation, surfaces of stainless steel/nickel/ copper/brass/ monel/ aluminum/ hastelloy/lead/ galvanized steel items, valve stem, pump rods, shafts, gauges, bearing and contact surfaces, lined or clad surfaces.

1.04.00 All pipelines shall be Colour coded for identification as per the NTPC Colour-coding scheme, which will be furnished to the contractor during detailed engineering.

1.05.00 **SURFACE PREPARATION**

1.05.01 All surfaces to be painted shall be thoroughly cleaned of oil. Grease and other foreign material. Surfaces shall be free of moisture and contamination from chemicals and solvents.

1.05.02 The following surface preparation schemes are envisaged here. Depending upon requirement any one or a combination of these schemes may be used for surface preparation before application of primer.

SP1	Solvent cleaning
SP2	Application of rust converter (Ruskil or equivalent grade)
SP3	Power tool cleaning
SP4	Shot blasting (shot blasting shall be used as surface preparation method for hot worked pipes prior to application of primer)
SP4*	Shot blast cleaning/ abrasive blast cleaning to SA21/2 (near white metal) 35-50 microns
SP5	Shot blasting/ abrasive blasting.
SP6	Emery sheet cleaning/Manual wire brush cleaning.

1.06.00 **APPLICATION OF PRIMER/PAINT**

1.06.01 The paint/primer manuacturer's instructions covering thinning, mixing, method of application, handling and drying time shall be strictly followed and considered as part of this specification. The Dry film thickness (DFT) of primer/paint shall be as specified herein.

1.06.02 Surfaces prepared as per the surface preparation scheme indicated herein shall be applied with primer paint within 6 hours after preparation of surfaces.

1.06.03 Where primer coat has been applied in the shop, the primer coat shall be carefully examined, cleaned and spot primed with one coat of the primer before applying intermediate and finish coats. When the primer coat has not been applied in the shop, primer coat shall be applied by brushing, rolling or spraying on the same day

as the surface is prepared. Primer coat shall be applied prior to intermediate and finish coats.

1.06.04 Steel surfaces that will be concealed by building walls shall be primed and finish painted before the floor is erected.Tops of structural steel members that will be covered by grating shall be primed and finish painted before the grating is permanently secured.

1.06.05 Following are the Primer/painting schemes envisaged herein:

PS3 - Zinc Chrome Primer (Alkyd base) by brush/Spray to IS104.

PS3* - Zinc Chrome primer (Alkyd base) by dip coat.

PS4 - Synthetic Enamel (long oil alkyd) to IS2932.

PS5 - Red Oxide Zinc Phosphate primer (Alkyd base) to IS 12744

PS9 - Aluminium paint to IS 2339.

PS9* - Heat resistant Aluminium paint to IS-13183 Gr.-1

PS13 - Rust preventive fluid by spray, dip or brush.

PS14 - weldable primer-Deoxaluminate or equivalent.

PS16 - High Build Epoxy CDC mastic `15' .

PS17 - Aliphatic Acrylic Polyurethane CDE134 ,%V=40.0(min.)

PS18 - Epoxy based TiO2 pigmented coat

PS19 - Epoxy Zinc rich primer (92% zinc in dry film (min.), %VS=40.0(min.)

PS-20 - Epoxy based finish paint

1.06.06 All weld edge preparation for site welding shall be applied with one coat of wieldable primer.

1.06.07 For internal protection of pipes/tubes, VCI pellets shall be used at both ends after sponge testing and ends capped. VCI pellets shall not be used for SS components and composite assemblies.

1.06.08 SG membrane walls and other Flue gas swept pressure part surfaces shall be applied with appropriate primer for protection of surfaces during transit, storage and erection.

1.06.09 a) All un-insulated equipments, pipes, valves etc covered in sub-section A-08 (Steam Turbine & Auxiliary system) shall be painted with paint not inferior to Epoxy resin based paints with minimum DFT of 150 micron.
The paint shall be applied in three stages i.e. primer, intermediate and finish coats in following manner:

- Primer coat – Epoxy based zinc phosphate
- Intermediate - Epoxy based TiO2 pigmented coat
- Finish coat - Epoxy based finish coat

b) Equipment, pipes etc. with high temperature shall be painted with heat resistant aluminum paint (to be selected based on the service condition of component as per IS-13183). Two coats of paint shall be applied with total DFT 40 micron.

c) Surface preparation before painting shall be carried out according to requirement indicated in this sub-section and international standard

1.06.10

A) Specification for the application of Epoxy coating for internal protection of DM tank & other vessels/tanks (as applicable) shall be as follows:

Primer : One coat of unmodified epoxy resin along with polymide hardener.

Paint : Two (2) coats unmodified epoxy resin along with Aromatic adduct hardener.

Total thickness of primer and paint should not be less than 400 microns.

B) Specification for application of chlorinated Rubber paint for external protection vessel, tanks, piping, valves & other equipments shall be as follows:

i) For Indoor vessel, tanks, piping, valves & other equipments:

(a) Surface preparation shall be done either manually or by any other approved method.

(b) Primer coat shall consist of one coat of chlorinated rubber based zinc phosphate primer having minimum DFT of 50 microns.

(c) Intermediate coat (or under coat) shall consist of one coat of chlorinated rubber based paint pigmented with Titanium dioxide with minimum DFT of 50 microns.

(d) Top coat shall consist of one coat of chlorinated rubber paint of approved shade and colour with glossy finish and DFT of 50 microns.

Total DFT of paint system shall not be less than 150 microns.

ii) For Outdoor vessel, tanks, piping, valves & other equipments:

(a Surface preparation shall be blast cleared using non-siliceous abrasive after usual wire brushing, which shall conform to Sa 2-1/2 Swiss Standard.

(b Primer coat shall consist of one coat of epoxy resin based zinc phosphate primer having minimum DFT of 100 microns.

(c) Intermediate coat (or under coat) shall consist of epoxy resin based paint pigmented with Titanium dioxide with minimum DFT of 100 microns.

(d Top coat shall consist of one coat of epoxy paint suitable pigmented of approved shade and colour with glossy finish and DFT of 75 microns. Additionally finishing coat of polyurethane of minimum DFT of 25 microns shall be provided.

The paint may be applied in one coat, in case high built paint is used, otherwise two coats shall be applied.

Total DFT shall not be less than 300 microns.

1.06.11 Primer/Painting Schedule

Sl. No	Description		Surface Preparation	Primer Coat			Intermediate Coat			Finish Coats			Total Min. Painting DFT (Microns)	Colour Shade
				Type of Primer	No. of Coats	Min. DFT / coat (Microns)	Type of coating	No. Coats	Min. DFT/ Coat (Microns)	Type of coating	No. Coats	Min. DFT/ Coat (Microns)		
A) Power Cycle Piping														As per NTPC Colour shade/ coding scheme
1.	All insulated Pipings, fittings/ components, Pipe clamps, Vessels/Tanks, Equipments etc.		SP3/SP4	PS9*	1	20	-	-	-	PS9*	1	20	40	
2.	All un-insulated Pipings, fittings/ components, Pipe clamps, Vessels/Tanks, Equipments etc.	Design temperature < or equal to 60^0C	SP3/SP4	PS 5	2	25	-	-	-	PS 4	3 **$**	35 **$**	155 **$**	
		Design temperature above 60^0C-200^0C	SP3/SP4	PS 9*	1	20	-	-	-	PS9*	1	20	40	
		Design temperature > 200^0C	SP3/SP4	PS9*	1	20	-	-	-	PS9*	1	20	40	
3	Constant Load Hanger (CLH) and Variable Load Hanger (VLH)		SP4*	PS19	1	40	-	-	-	PS17	1	30	70	

4	Piping hangers/ supports (other than (3) above. (un-insulated)		SP4 (SP6 - for cleaning of weld joints after erection,)	PS 5	1	40	PS 4	1	40	PS 17	1	40	120
	Valves												
5.	Cast/Forged	Design temperature < or equal to 60 degC	SP1/SP2/SP3	PS4/PS9	1	40	Polyamide Epoxy	1	100	PS17	1	40	180
		Design temperature above 60 degC and up to 200 degC	SP1/SP2/SP3	PS 9*	1	20	-	-	-	PS9*	1	20	40
		Design temperature above 200 degC	SP1/SP2/SP3	PS9*	1	20	-	-	-	PS9*	1	20	40
6.	All auxiliary Structural Steel components for pipe supports	Outside TG building and in SG envelope	SP4*	Inorganic Ethyl Zinc Silicate	1	75	PS18	1	75	a))Epoxy coat b)Final coat of paint PS17	2 1	35 30	250