Bharat Heavy Electricals Limited
Piping Centre Chennai-17

Specification Number	Rev.no.	Sheet Number
PC:TSP:APRDS/NEYVELINEW	00	1 of 25

TECHNICAL SPECIFICATION FOR AUX.PRDS CONTROL VALVES

NLC-NEYVELI NEW THERMAL POWER PROJECT
2X500MW (UNIT 1 & 2)

CONTENTS

00	03.11.15		SD/-	SD/-	SD/-
		Fresh Issue	E.KRITHIGA	R.PRABHA	C.SARAVANAN
Rev	Date	Alteration	Prepared	Approved(C&I)	Approved (Mech.)

Important note to the Bidder

Bidder is to take Photostat copy of Table V-A & Table V-B, control valve data sheets, Section VII and section VIII of this specification, fill it by neatly typing and submit the same along with the offer. Non-compliance of the above shall lead to rejection of the offer. Information called for in the above tables, sections of the Technical specification furnished in any other format shall be considered only for information.

SECTION - I
INTENT OF SPECIFICATION

1.0 This specification is intended to cover the design, engineering, manufacture, shop Fabrication, assembly, tests and inspection at manufacturer's works, packing and despatch of control valves for the mentioned project.

2.0 The equipment to be supplied as per this Technical specification shall be suitable for the site conditions specified in Equipment specification (Section III)

3.0 It is not the intent to completely specify herein all aspects of design and construction of equipment. Nevertheless the equipment shall conform to all aspects of high standards of engineering , design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to the purchaser who will interpret the meaning of the specification, drawings and shall have right to accept or reject any work or material which in his assessment is not complete to meet the requirements of this specification and/or applicable national and/or international standards mentioned elsewhere in the specification.

4.0 If any provision of this specification departs from the bidder's usual construction sufficiently to materially increase cost of equipment without (in bidders opinion) providing a corresponding increase in quality or if the bidder considers that his usual construction would provide better quality, the Bidder shall call this to the attention of the Purchaser by submitting an alternate bid. However in any case, a base bid shall be submitted based on the equipment and services as specified.

SECTION - II

SCOPE OF WORK AND SUPPLY

1.0 SCOPE OF WORK

The scope of work of this specification shall include design, manufacture and delivery of control valves as detailed in various sections of this specification.

2.0 SCOPE OF SUPPLY

1. High Capacity Combined PRDS Valve	TAG No. AS-22
2. Low Capacity Pressure Control Valve	TAG No. AS-26
3. Common Spray Block Valve	TAG No. CDV-01
4. High Capacity Spray Control Valve	TAG No. CDV-03
5. Low Capacity Spray Control Valve	TAG No. CDV-10
6. LT Desuperheater	TAG No. DESH-1

Complete accessories such as pneumatic diaphragm actuators, smart positioners, air lock valve, limit switches, air-set (air filter with regulators and gauges), solenoid valves, junction box and hand wheel for all control valves. All accessories shall be mounted integrally, tubed and supplied.

SECTION - III

EQUIPMENT SPECIFICATION

1	High Capacity Combined PRDS Valve TAG No. AS-22	4-00-306-40691/R00 (3 SHEETS)
2	Low Capacity Pressure Control Valve TAG No. AS-26	4-00-306-40693/R00 (3 SHEETS)
3	Common Spray Block Valve TAG No. CDV-01	4-00-306-40694/R00 (3 SHEETS)
4	High Capacity Spray Control Valve TAG No. CDV-03	4-00-306-40696/R00 (3 SHEETS)
5	Low Capacity Spray Control Valve TAG No. CDV-10	4-00-306-40697/R00 (3 SHEETS)
6	LT Desuperheater TAG No.DESH-1	4-00-306-40695/R00 (1 SHEET)
7	Schematic Arrangement of Aux. PRDS station	4-00-306-40800/R00 (1 SHEET)

Section IV

General Technical Requirements

1.0 The Control valves and accessories furnished by the bidder shall be designed, constructed and tested in accordance with the latest applicable requirements of code for power piping ASME B31.1, the ASME Boiler & Pressure vessel code, Indian Boiler Regulation (IBR), ISA, and other standards specified elsewhere as well as in accordance with all applicable requirements of the "Federal Occupational Safety and Health Standards, USA" or acceptable equal standards.

2.0 The design of all valve bodies shall meet the specification requirements and shall conform to the requirements of ASME for dimensions, material thickness and material specification for their respective pressure classes.

3.0 The valve sizing shall be suitable for obtaining maximum flow conditions with valve openings at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve stem travel. All the valves shall be capable of handling at least 120% of the required maximum flow. Further the valve stem travel range from minimum flow condition to maximum flow condition shall not be less than 50% of total valve stem travel. The sizing shall be in accordance with the latest edition of ISA handbook on control valves. While deciding the size of valves, Bidder shall ensure that velocity at valve outlet does not exceed 8 m/sec for liquid service, 150 m/sec for steam services and 50% of sonic velocity for flashing services. Bidder shall furnish the sizing calculations clearly indicating the outlet velocity achieved with the valve size selected by him as well as noise calculations, which will be subject to Owner's approval during detailed engineering.

4.0 Control valves for steam and water applications shall be designed to prevent cavitation, wire drawing, flashing on the downstream side of valve and downstream piping. Thus for cavitation / flashing service, only valve with anti cavitation trim shall be provided. Detailed calculations to establish whether cavitation will occur or not for any given application shall be furnished.

5.0 All Control valves shall have leakage rate as per leakage class IV.

6.0 The control valve induced noise shall be limited to 85 dba at 1.0 meter from the valve surface under actual operating conditions. The noise abatement shall be achieved by valve body and trim design and not by use of silencers.

7.0 The characteristic of control valves shall be determined based on the application / service.

8.0 **Valve construction:**

8.1 All valves shall be of globe body design & straightway pattern with single or double port, unless otherwise specified or recommended by the manufacturer to be of angle body type. Rotary valve may alternatively be offered when pressure and temp. drops permit.

8.2 Valves with high lift cage-guided plugs & quick-change trims shall be supplied.

8.3 Cast Iron valves are not acceptable.

8.4 Bonnet joints for all control valves shall be of flanged and bolted type for easy dis-assembly. Bonnet joints of internal threaded or union type are not acceptable.

8.5 Plug shall be of one-piece construction either cast, forged or machined from solid bar stock. Plug shall be screwed and pinned to valve stems or shall be integral with the valve stems.

8.6 All valves connected to vacuum on down stream side shall be provided with packing suitable for vacuum application (e.g Double Vee type chevron packing)

8.7 Valve characteristic shall match with the process characteristics.

8.8 Extension Bonnets shall be provided when the maximum temperature of following fluid is greater than 280° C

8.9 Flanged valves shall be rated at no less than ASME pressure class of 300 lbs.

8.10 Valve body shall be marked to show direction of flow.

9.0 **Valve Actuators:**

9.1 All control valves shall be furnished with pneumatic actuators. The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements. The valve actuators shall be capable of operating at 60° C continuously.

9.2 Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance for stem force, at least 0.15 Kg/cm^2 per linear millimetre of seating surface, shall be provided in the selection of actuator to ensure tight seating unless otherwise specified.

9.3 The travel time for the pneumatic actuators shall not exceed 10 seconds.

9.4 Selection of actuator shall be such that it meets the requirement of thurst/torque, stroke Length, angular movement, full scale travel time, repeatability, accurate positioning for successful operation of final control element.

9.5 All actuators shall have also provision for manual operation during emergency/ maintenance along with graduated local position indicator.

10.0 Control valve Accessory Devices:

10.1 All control valve accessories such air locks, hand wheels / hand-jacks, limit switches, smart positioners, solenoid valves, diffusers, external volume chambers, tubing and air sets and junction boxes etc. Shall be provided as per requirements.

11.0 NAME PLATE:

11.1 Name plate shall be of engraved chromium plate or label with engraving filled with enamel. Nameplate data shall be inscribed on the plate in such a manner that it cannot erode or peel off. Name Plate inscriptions shall be bilingual in Hindi followed by English. Alternatively two separate plates one with Hindi and other with English inscriptions may be provided.

11.2 Name plate shall be marked in accordance with MSS standard SP-25 and ASME B16.34 as a minimum.

11.3 Valves shall be identified by owner's tag no. on a metal tag permanently attached to a non pressure part, such as the yoke by a stainless steel wire.

11.4 All exposed steel surfaces are to be painted before despatch as per technical requirements.

Section V

Spares & Special Tools

1.0 Commissioning spares

Commissioning spares are those spares, which may be required during start up, and commissioning of the unit. Bidder must quote for these spares and unit prices to be indicated.

2.0 Recommended spares

Recommended spares for all the items for three-year operation. Bidder must quote unit prices. Bidder shall indicate the shelf life for gaskets, packing etc. The recommended spares list shall be independent of the list of mandatory spares. The purchaser reserves the right to buy any or all of the recommended spare parts.

3.0 Mandatory spares

Mandatory spares are those spares, which are considered essential by the purchaser for Normal operation of the plant. If such spares are indicated, bidder shall indicate the Price for each and every item in the schedule of mandatory spares whether or not the Bidder considers it necessary for the purchaser to have it. If the bidder fails to comply With the above or fails to quote the price of any mandatory spares the cost of such Spares shall be deemed to be included in the contract price.

4.0 Bidder shall quote separately the special tools if any required for erection, commissioning and maintenance of the equipment if the bidder considers it as essential whether or not the requirement of such tools are indicated in this specification. However, if the requirements of such tools are indicated, bidder shall indicate the price for each and every item of the special tools indicated. If the bidder fails to comply with the above or fails to quote the price of special tools indicated, the cost of such special tools shall be deemed to be included in the contract price. All tools shall be new and unused.

5.0 Bidder shall identify the Commissioning spares, Recommended spares and Mandatory Spares in the cross sectional drawing or in the catalogue for easy reference.

6.0 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. eg. Small Items shall be packed in sealed transparent plastic bags with dissector packs as necessary.

7.0 Each spare shall be clearly marked or labelled on the outside of the packing with its description. When more than one spare part is packed in a single case a general description of the contents shall be indicated on the outside of such cases and a detailed list enclosed. All cases, containers and other package must be suitably marked and numbered for the purpose of identification.

8.0 All spare parts furnished shall be new and unused. The contractor shall guarantee that in the event of any of the spares offered goes out of production notice shall be given to the owner sufficiently in advance to enable him to order this requirement of spares in one lot, if he so desires.

9.0 Bidder shall indicate the service expectancy period for the spare parts under normal operating conditions before the replacement is necessary.

10.0 Complete manufacturing drawings of items shall be given to the owner as and when any spare parts is discontinued from manufacturing.

11.0 Bidder shall furnish the list of spare and special tools required as per the Table V-A and V-B.

12.0 Requirement of Mandatory Spares are indicated in Table V-C.

TECHNICAL SPECIFICATION FOR AUX.PRDS CONTROL VALVES

TABLE V-A

LIST OF SPARES
(To be filled in by the bidder)

Sl. no	Description of spare	Reference Drawing.	Item no.	Qty. reqd For commissioning Spare.	Qty. reqd For Recommended Spare.	Qty. reqd For mandatory Spare.	COST / No

Signature of the bidder.

TABLE V-B

LIST OF special tools
(To be filled in by the bidder)

Sl. no	Description of the tool	Reference Drawing.	Item no.	Quantity	COST / No

Signature of the bidder.

TABLE-V-C
MANDATORY SPARES

Vendor to work out quantity of spare as per logic specified by customer in the below table. Duplicate items should not be quoted as mandatory spare.

S No.	Description	Qty	Unit
1.	High Capacity PRDS system(MS)		
1.0	Desuperheater Liner	1	Set
1.1	Steam Pressure reducing cum desuperheating valves		
	i. Stem	1	No.
	ii. Disc	1	No.
	iii. Body seat rings	2 for each type, size and rating of valves	Nos.
	iv. Gland packing	3 for each type, size and rating of valves	Nos.
	v. Pressure seal ring	3	Nos.
	vi. Gasket	3	Nos.
1.2	High capacity spray water control valves Valve trim including cage, plug, stem, seat rings, guide bushings, stem packing	1 for each type, size and rating of valves	No.
2.	Low capacity PRDS system (CRH)		
2.0	Desuperheater liner(LT DESH)	1	Set
2.1	Low capacity PRV valve		
	i. Stem	1	No.
	ii. Disc	1	No.
	iii. Body seat rings	2 for each type, size and rating of valve	Nos.
	iv. Gland packings	3 for each type, size and rating of valve	Nos.
	v. Pressure seal ring	3	Nos.
	vi. Gasket	3	Nos.
2.2	Low capacity spray water control valves. Valve trim including cage, plug, stem, seat rings, guide bushings, stem packing	1 for each type, size and rating of valve	No.

Quality Assurance, Inspection and Testing

1.0 General:

1.1 All equipment covered under this specification shall be subject to inspection and test by the purchaser during manufacture, erection and commissioning. The approval of the purchaser of the results of the tests and inspection will not however, prejudice the right of the owner to reject the equipment if it does not comply with the specification when erected or does not give complete satisfactory service. The cost of all such tests shall be borne by the contractor.

1.2 Testing / Inspection procedures as detailed herein to give a basic quality control programme to be followed by the Bidder, are in no way comprehensive and in no way form a complete quality assurance programme. Any other inspection stage not mentioned in these clauses but required as per the Bidder's process control shall be deemed to be included. Any tests necessary from operation, safety and reliability point of view shall also be included. Such tests shall be subject to the approval / recommendation of the Purchaser.

1.3 The Bidder shall furnish the quality control procedures to be adopted for assuring quality of each equipment under this specification from the receipt of material at site, during storage, erection, pre-commissioning to final trial run and commissioning of the valves. These procedures shall necessarily include all checks / tests conducted at site for preservation, pre-assembly, alignment, positioning of equipment, foundation preparation, welding / bolting, heat

treatment, non-destructive examination, hydraulic test, performance test etc. The above shall be discussed and finalised with the Purchaser.

2.0 Shop Tests:

2.1 The contractor shall permit the Purchaser, if he so desires to maintain one or more of his representatives in the Contractor's shops and/or at the shops of his sub-contractors for the purpose of inspecting the various steps in the shop fabrication and the various tests to be performed for the materials supplied under this specification. The Purchaser's representative(s) shall have complete access to all parts of the shop wherein work under this specification is to be performed.

2.2 The contractor shall adopt good quality control procedures and provide inspection in his works and that of his sub-contractors to ensure the mechanical accuracy of components, compliance with drawings, identify and acceptability of all material, part and equipment. He shall conduct all tests required to ensure that the equipment furnished conforms to the requirements of the applicable codes. All tests and test procedures proposed by the manufacturer/fabricator shall be submitted to the purchaser for his prior approval. The purchaser shall be notified well in advance of the fabrication and major tests of the appurtenances and equipment, for the purpose of making general inspections and progress reports.

2.3 The Purchaser's representative shall have full access to the shops where the equipment to be supplied is being tested and all test records including records on heat treatment, radiography, ultrasonic test, magnetic particle test, material analyses etc. shall be made available to him. When the contractor offers finished

equipment for final inspection, notice of at least 15 days shall be given to the purchaser to enable his inspector to plan and carry out the inspection.

2.4 No material shall be despatched to the site from the manufacturers works until the owner has arranged for and carried out inspection to his satisfaction or has waived this requirement in writing.

2.5 Material test and analysis:

All materials shall be furnished in strict accordance with the applicable codes and the detailed specifications herein. All sources of material shall be disclosed and relevant test certificates giving precise details of identification of material, the physical and chemical properties of the material shall be submitted to the owner for approval. Test coupons shall be cast from the same melt for the body & disc.

2.6 Shell Test:-

All valves shall be subjected to shell test as per ANSI B16.34 and MSS-SP-61. All gaskets used for test shall be of the same material and design as specified for the finished products. Where mechanical gasket joints are broken following tests, new gaskets shall be fitted with the equipment and the joints shall be re-tested.

2.7 100% visual check shall be carried out for dimensions, end connection details and Surface finish of the equipment.

2.8 The complete inspection shall be carried out as per the owner's quality plan.

2.9 The inspection shall be carried out as per the drawing approved by the purchaser

Section VII
Documents to be furnished along with the offer

Note: a) All documents shall be in ENGLISH language only
b) Only units followed in this specification are to be used.

Sl.no	Description	To be filled by the bidder. Bidder's drawing or document reference (if not furnished "not furnished" with reason
1.0	General arrangement drawing of the valves with operators and other special accessories indicating clearly a) overall dimensions, b) Weight of valve, actuator & special accessories, c) Model no. d) Make & country of Manufacture, e) Rating/Design code f) Type g) End connection details h) Type of operator i) Make of operator and Model No. j) Valve Tag nos.	
2.0	Cross sectional drawing of the valve with operators and special accessories indicating minimum the following:	

	i) Names of all parts ii) Material of construction of all parts(Material specification shall not be in general terms like carbon steel, Alloy steel etc. Material specification shall conform to International standards. In case of Material specification other than ASTM, equivalent ASTM material specification to be indicated. No part of the valve to be left in the Tabulation).	
3.0	Minimum the following parts to be covered if applicable. a) Body b) Bonnet, Cap c) Disc d) Stem e) Plug f) Disc seat g) Stem guide h) Gasket i) Gland packing j) Bolts & studs k) Nuts	

	l) Hand wheel iii) Weight of all parts iv) Erection, commissioning and Mandatory Spares identification along with their Quantity. v) Weight of valve & actuator separately Total weight and flooded weight vi) Class rating as per ASME B16.34 vii) Make & Country of Manufacture viii) Actuator Make & Type ix) End connection details	
4.0	Relevant catalogues for the valves	
5.0	List of Tender deviations (It will be presumed that the bidder has no tender deviations in case bidder failing to furnish the same).	

Certified that all the information called for is available in the document or drawing indicated above.

Certified that our supply of valves will be in line with the Technical specification except the deviations furnished in Table IIIA and in the list of Tender deviations enclosed if any.

(signature of the bidder).

SECTION VIII

Documents to be furnished after award of the contract

Note: a) All documents shall be in ENGLISH language only
b) Only units followed in this specification are to be used.
c) All documents shall contain the project name
d) Applicable valve tag nos.

Sl.no	Description	Ref. Drawing	No of days reqd. To submit for approval after LOA / TOA or to resubmit for approval after BHEL comments.	No. of copies to be sent for approval.	No of days to furnish final drg after final approval.	No of copies to be furnished after final approval.
1.0	General arrangement drawing as per point 1 , section VII.		15	5	5	15+1 CD
2.0	Cross sectional drawing as per point 2 , section VII		15	5	5	15+1 CD
3.0	Applicable catalogue of valve.		15	5	5	15+1 CD
4.0	Erection, commissioning, operation and maintenance Manuel containing minimum of the following detail.		LATER	5	5	15+1 CD

	1) General arrgt. & cross sectional arrgt. Drgs as per point 1&2 of section VII respectively		15	5	5	15+1 CD
	2) Actuator data sheet and wiring diagram of actuators.					
	3) List of Ball & Roller bearing schedule.					
	4) List of lubrication oil schedule					
	5) Do's and Do not's for valves & actuators.					
	6) Erection procedure & precautions to be taken.					
	7) Commissioning procedure & precautions to be taken.					
	8) Operating & maintenance instructions.					
5.0	Test certificates.		Not Applicable.	Nil	45	15+1 CD
	1) Raw material test certificates (chemical & mechanical)					
	2) Hydro test certificates.					

	3) Seat test certificates					
	4) Back seat test certificates					
	5) NDT & other test certificates as per ASME B 31.1					
6.0	IBR and other mandatory requirements if required.		Not Applicable	Nil	45	15+1 CD
7.0	Drawings in sl no: 1.0 & 2.0 recorded in CD		Not Applicable	Nil	60	15+1 CD

Certified that the drawings / documents will be submitted / furnished as per the above Table.

(Signature of the Bidder)

CHECKLIST FOR CONTROL VALVES(To be filled by bidder)

ENQUIRY NO:		**DATE:**
PROJECT:		
VALVE DESCRIPTION:		
VALVE TAG NO:		

S.NO	SPECIFICATION REQUIREMENT	COMPLIED	NOT COMPLIED	REMARKS	BHEL ACCEPTANCE
1	**SCOPE OF SUPPLY**				
1.1	Design, fabrication, testing with complete actuators and accessories meeting specification and datasheets				
1.2	All interconnecting instrument testing and fittings between valve actuator, positioner and air regulator				
1.3	Valve drawing, calculation and specification sheet				
1.4	Commissioning spares				
2	**CONFLICTS AND DEVIATION**				
2.1	Conflicts between this specification and applicable international/industrial standards and codes				
2.2	List of deviation taken by vendor				
3	**MATERIALS**				
3.1	Material selection for trim				
3.2	Material selection for gasket/packing				
3.2.a	PTFE upto 230 deg C				
3.2.b	Graphite above 230 deg C				
4	**FLOW DIRECTION**				
4.1	Liquid service: Flow to close				
4.2	Gas service: Flow to open				
5	**NOISE**				
5.1	Noise abatement within limits shall be achieved by valve body and trim design without using diffusers, baffle plates and silencers				
6	**FLOW CHARACTERISTICS**				
6.1	Flow characteristics shall meet rangeability requirements and stable control over required range of operating condition				
7	**PERFORMANCE**				
7.1	Valve travel position accuracy less than 2%				
7.2	Stability-In modulation not more than 2%				
7.3	Fail position				
8	**Cv TEST**				
8.1	Cv full capacity(Rated Cv) as per ISA-75.02 characteristics at every 10% travel				
9	**% LIFT**				
9.1	Valve stem travel range from Minimum flow to Maximum flow condition shall not be <50% of total stem travel				
10	**CONTROLS AND INSTRUMENTATION**				
10.1	Pneumatic Actuator shall be adequately sized , for a Delta – P equal to Design Pr .				

10.2	Following accessories shall be provided(wherever applicable, accessories shall be of minimum IP-65)				
10.2a	SMART Positioner				
10.2b	Air Filter Regulator				
10.2c	Open Limit Switch & Close Limit Switch (contact rated for 5A, 240 V, AC)				
10.2d	Air lock valve				
10.2e	Solenoid valve (to ensure stayput, 24 V, DC, 2 wire)				
10.2f	Volume booster (required only if specified travel time is not met).				
10.2g	36 way Junction Box with plug and socket connector (all accessories to be wired upto JB)				
10.3	**SMART Positioner**				
10.3a	Bidder to confirm supply of SMART Positioner (Electro Pneumatic) with HART protocol, having fail freeze feature on failure of 4 - 20 mA demand (control) signal. Fail freeze shall be achieved by the Positioner for both the following conditions (a) Loss of control signal, including breakage of control cable (b) Failure of 24V, DC supply (this shall not be achieved through external solenoid valve) Bidder shall specifically mention the make and model number(only latest) of quoted SMART positioner.				
10.3b	Position feedback 4 - 20 mA output is part of SMART Positioner . (ie Positioner shall have inbuilt Position feedback module to generate 4 – 20 ma feedback signal) .				
10.4	All CV accessories shall be tubed / piped and supplied as a single assembly.				
10.5	Bidder to note that all CV documents of finalized bidder is subject to BHEL/Customer approval .				
	Note: Separate I/P converter is NOT applicable				

CHECKLIST FOR APRDS CONTROL VALVES(To be filled by bidder)

(Additional points apart from Checklist for Control valves)

ENQUIRY NO:		**DATE:**
PROJECT:		
VALVE DESCRIPTION:		
VALVE TAG NO:		

S.NO	SPECIFICATION REQUIREMENT	COMPLIED	NOT COMPLIED	REMARKS	BHEL ACCEPTANCE
1	**GENERAL**				
1.1	Split rating/ Full rating				
1.2	LT Desuperheater-Horizontal/ Vertical				
1.3	LT Desh-Upstream and Downstream length acceptable as per Layout attached				
1.4	Smart Positioner as per Customer specification				

CI 12/A

CONTROL VALVE SPECIFICATION SHEET

(IN ACCORDANCE WITH I.S.A. FORM S20.51)

PROJECT: NEYVELI NEW TPP 2X500MW PROJECT
STEAM GENERATOR PACKAGE

CUST.No: 7232, 7233

GENERAL:THIS IS TO BE READ ALONG WITH TECHNICAL SPECIFICATION PC: TSP: APRDS: NEWNEYVELI

1. Valve tag No. : ASV–22
2. Service : High capacity combined PRDS valve
3. Line No./Vessel No. :
4. Qty. required per unit : ONE
5. Manufacturer : *
6. Model No. : *
7. Rating : ASME CL. 3000 Spl.
8. Total Qty Required : 2 Nos.

BODY:

9. Type : Thru ☐ 3 Way ☐ Z type ☐ Angle ☑ ☐
10. Form : Globe ☑ Ball ☐ Butterfly ☐ ☐
11. Size : *
12. Port Size : *
13. Connecting Pipe size — Steam Inlet : OD 219.1 x 40; Steam Outlet : OD 457.2 x 85; Spray inlet : OD 48.3 x 5.08
14. Body rating : ASME CL. 3000 Spl.
16. Bonnet type : Standard ☐ Finned ☑ Extended ☑ Pr. seal ☐ ☐
17. Material : Body : ASTM A182Gr.F22/SA217WC9; Packing : GRAFOIL; Bolting : *
18. Flow direction : SIDE ENTRY–BOTTOM EXIT
19. Suitable matching pieces to match with pipe size specified shall be offered.

15. Type of end connections : Screwed ☐ NPI ☐ Flanged ☐ ANSI ☐ — BW ☑ (Steam side) BSPT ☐ ☐ DIN ☐ — SW ☑ (Spray side) BS ☐ ☐

Edge preparation as per BPS. STY 'P'; d1=143.6(steam inlet) and d1=297(steam outlet)

TRIM:

20. No. of ports : *
21. Type : Balanced ☑ Unbalanced ☐
22. Plug characteristics: ~~L/LV~~/EP ✓ / ~~MODIFIED EP~~
23. Guiding : Cage ☑ Port ☐ Top ☐ Bottom ☐
24. Stem material :
25. Plug material :
26. Seat material :
27. Disc material :
28. stem guide material : } 440C OR EQUIVALENT
29. Cage Material : F22 Ion Nitrided (or) Better

ACTUATOR:

30. Type : Electric ☐ Hydraulic ☐ Pneumatic ☑ DA/RA(Air To Close) ✓
31. Size : *
32. Supply : 5–8 Kg/cm^2 Shut off Pressure : 8 Kg/cm^2
33. Failsafe position of valve. : Stayput ☑ Full Close ☐ Full Open ☐
34. Diaphragm/Cylinder pressure at Valve full open : * Valve full close :
35. Force required for process & Force available at actuator. : *
36. Actuator sizing ΔP : *
37. If actuator electric fill in data sheet as per annexure furnished and shall comply with annexure–I specification. : NAPL

REV	DATE	ALTERATION	PREPARED	APPD./MECH	APPD/C&I
00	20.04.15	FRESH ISSUE	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40691 REV 00

POSITIONER:

38. Type : Pneumatic ☐ Electronic ☐
DA/RA Electro Pneumatic ☑
(SMART WITH FAIL FREEZE FACILITY)#

39. If Electronic : Type :
Model : Solid plate deversing contactors
Main contactor : Solid state thyristor: ☐
Relay Switching : ☐
Also refer annexure – II
position indicator reqd. for Valve & VCB

40. If Pneumatic : Type : SMART
Model : *
Split range : Yes ☐ No ☑
Controller Input & Output Signal Value : 4–20 mA
Air supply : 5 Kg/cm^2
Input/Output Pr. guage :
Required : Yes ☑ No ☐
By pass provision : Yes ☐ No ☑
Action : Direct ☐ Reverse ☐ Both ☑
Cam : =% ☐ Linear ☐ Both ☐

ACCESSORIES:

41. Handwheel : Yes ☑ Side ☑ Top ☐
42. Air filter : Yes ☑ No ☐
Filter Size : 5 Micron ☑ 25 Micron ☐
43. Limit Switches : Yes ☑ No ☐
Qty. : 1 at full open &
: 1 at full close
Rating : 240v. 5Amp. ac
No of contacts per switch : 2No + 2NC
44. Solenoid valve to effect
Stayput : Yes ☑ No ☐
Type : 3 Way universal : Yes ☑ No ☐
Rating : 24V DC 2 wire
Class H coil : Yes ☑ No ☐
45. Vol. booster : Yes ☐ No ☑
46. Travel time : < 10 Sec
47. Installation : Indoor ☐ Outdoor ☑
48. All accessories enclosure : IP65$

49. Isolated Position transmitter : Yes ☐ No ☑
Type : Pnuematic : ☐ Electronic Non contact type ☐
Rating : 2 wire 24V DC: ☐ ☐
Output : 4–20 ma : ☐ 3–15 paig ☐
50. Torque Switches : Yes ☐ No ☑
Qty. :
Rating :
51. Air lock : Yes ☑ No ☐
Function : TO EFFECT STAYPUT
Type * : 3 Way single acting ☐
: 3 Way double acting ☐
52. Ambience : Dusty corrosive ☑
Toxic hazardous : ☐ ☐
53.1. Local position Indicator : Required.
53.3 Integral JB : 36 Way JB required
53.4 All electrical terminating : plug & socket type

MISCELLANEOUS:

54. Seat leakage : FCI 70.2 class ☑ CLASS IV$
I.S.A : ☐ ☐
55. Approx. weight (total) : *
56. Space requirements for online servicing : *

57. Valve sizing as per ISA 75.01 : Yes ☑ No ☐
58. Noise Level : Less than 85 DBA at 1m from Valve & Piping System.
59. Intertubing Diagram : As per Enclosed.
60. Performance Data
Linearity : ± 1 % Hyterisis : ± 0.5 %
Sensitivity : ± 0.5 % Accuracy (overall) : ± 2 %

VALVE SIZING DATA:

61. Medium : SH Steam ☑ Sat. Steam ☐
Water ☐
62. Flow rate in T/Hr
63. Operating inlet pressure in Kg/cm^2 (a)
64. Operating inlet temperature in °C
65. Outlet pressure in Kg/cm^2 (a)
66. Viscosity : --
67. Operating (required) Cv
68. Operating noise level at 1.0 metre from valve surface
69. Outlet velocity

CONDITION				
1	2	3	4	5
REFER DRAWING No. 4–00–306–40692 FOR VALVE SIZING DATA				

REFER STANDARD TABLE

<85	dba	(for all	conditions)	

DATE	PREPARED	APPD./MECH	APPD/C&I
20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40691 REV 00

DESIGN DATA:

		(A) Steam	(B) Spray	
70.	Design Pressure Kg/cm^2(g) :	199.1	39	*
71.	Design Temperature °C :	545	55	*

72. Rated/Design/Selected Cv of valve :
73. Velocity restriction : *
74. Operating lift restriction : 10 to 80 %$.
Stem travel range from min. flow to max.flow shall be around 50% of the total stem travel.

* { MAX.CLASS RATING BETWEEN (A) & (B) SHALL BE THE CLASS RATING FOR THE TOTAL VALVE

75. lift at various operating Conditions 1 TO 6 : *
76. Down stream limitations : *
77. Up stream limitations : *
78. Increase in signal Air : To open the Valve

TESTING/INSPECTION:

79.	Hydraulic test report :	Yes ☑	No ☐		
80.	Radiography : Critical Parts :	☑	Total ☐		
	Not required :	☐	☐		
81.	IBR test report : Reqd. :	☑	☐		
82.	Type test : *				
	Cv capacity test procedure as per ISA75.02: Required				
83.	Valve functional test :	Yes ☑	No ☐		
84.	Accessories functional :	Yes ☑	No ☐		
	Test :				
85.	Seat leakage test :	Yes ☑	No ☐		
86.	Material test report :	Yes ☑	No ☐		
87.	Customer Inspection :				
	In process :	Yes ☑	No ☐		
	Final :	Yes ☑	No ☐		
88.	Third Party inspection :	Yes ☐	No ☐		

* Type test to be done atleast for one no on this consignment.

DOCUMENTATION: (Required)

89. With bid. (3 sets)

Catalogues :	Yes ☑	No ☐	
Dimensional drawing :	Yes ☑	No ☐	
All data sheets :	Yes ☑	No ☐	
Recommendation / Limitation :	Yes ☑	No ☐	
Confirmatory report :	Yes ☑	No ☐	
Contrary report :	Yes ☑	No ☐	
Deviation report :	Yes ☑	No ☐	

90. Quality plan : Yes ☑ No ☐

91. With equipment :

Dimensional drawing :	15 Sets + 1 CD
O & M ** :	15 Sets + 1 CD
Data Sheets :	15 Sets + 1 CD
Test certificate :	03 Sets + 1 CD

92. Valve sizing, actuator sizing, noise level calculations required with bid(with formulae) : Yes ☑ No ☐

93. --

SPARES:

94. Commissioning spares : *
95. Mandatory spares : As per specification
96. 2/3 Years maintenance spares : *

OTHERS:

97.	Bidders experience list :	Required	☑	Not required	☐
98.	Operational feed back of such valves supplied elsewhere :	Required	☑	Not required	☐
99.	Equipment guarantee :	Required	☑	Not required	☐
100.	System guarantee :	Required	☑	Not required	☐
101.	Service contract for 5 Years : – To quote seperately				
102.	Commissioning of the valves :	Required	☐	Not required	☑

NOTES:

1. * DENOTES BIDDER TO SPECIFY; 2. ** VIDEO MANUAL PREFERRED.; 3. $ AS PER TENDER SPECIFICATION
4. # AFTER INSPECTION, SMART POSITIONER TO BE PACKED SEPARATELY ALONG WITH THE CONTROL VALVE AND MOUNTING ACCESSORIES. THE SAME WILL BE OPENED AND INSTALLED ONLY DURING COMMISSIONING.

20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA	DRG. NO: 4–00–306–40691	REV 00
DATE	PREPARED	APPD./MECH	APPD/C&I		

CI 12/A

CONTROL VALVE SPECIFICATION SHEET

(IN ACCORDANCE WITH I.S.A. FORM S20.51)

PROJECT: NEYVELI NEW TPP 2X500MW PROJECT
STEAM GENERATOR PACKAGE

CUST.No: 7232, 7233

GENERAL:THIS IS TO BE READ ALONG WITH TECHNICAL SPECIFICATION PC: TSP: APRDS: NEWNEYVELI

1. Valve tag No. : ASV–26
2. Service : Low capacity Pressure Control valve
3. Line No./Vessel No. :
4. Qty. required per unit : 1 No.
5. Manufacturer : *
6. Model No. : *
7. Rating : ASME CL. 600
8. Total Qty Required : 2 Nos.

BODY:

9. Type : Thru ☑ 3 Way ☐ Z type ☐ Angle ☐ ☐
10. Form : Globe ☑ Ball ☐ Butterfly ☐ ☐
11. Size : *
12. Port Size : *
13. Connecting pipe size : Inlet : OD 168.3X7.11 Outlet : OD 273X9.27
14. Body rating : ASME CL. 600
16. Bonnet type : Standard ☐ Finned ☑ Extended ☑ Pr. seal ☐ ☐
17. Material : Body : ASTM A217GrWC6/F11 CL2 Packing: GRAFOIL Bolting : *
18. Flow direction : HORIZONTAL
19. Suitable matching pieces to match with pipe/bold size specified shall be offered.

15. Type of end connections : Screwed ☐ BW ☑ SW ☐ NPI ☐ BSPT ☐ BS ☐ Flanged ☐ ☐ ☐ ANSI ☐ DIN ☐

Edge preparation as per BPS. STY 'D'; d1=155.6(inlet) and d1=254.5(outlet)

TRIM:

20. No. of ports : *
21. Type : Balanced ☑ Unbalanced ☑ ☐
22. Plug characteristics: ~~L/LV~~/EP / ~~MODIFIED EP~~
23. Guiding : Cage ☑ Port ☐ Top ☐ Bottom ☐
24. Stem material :
25. Plug material :
26. Seat material :
27. Disc material :
28. stem guide material :

17.4 PH SST OR EQUIVALENT

29. --

ACTUATOR:

30. Type : Electric ☐ Hydraulic ☐ Pneumatic ☑
31. Size : * ☐ DA/RA(Air To Close) ☑
32. Supply : 5–8 Kg/cm^2 Shut off Pressure : 8 Kg/cm^2
33. Failsafe position of valve. : Stayput ☑ Full Close ☐ Full Open ☐
34. Diaphragm/Cylinder pressure at Valve full open : * Valve full close :
35. Force required for process & Force available at actuator. : *
36. Actuator sizing ΔP : *
37. If actuator electric fill in data sheet as per annexure furnished and shall comply with annexure–I specification. : NAPL

REV	DATE	ALTERATION	PREPARED	APPD/MECH	APPD/C&I
00	20.04.15	FRESH ISSUE	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40693 REV 00

POSITIONER:

38. Type : Pneumatic ☐ Electronic ☐
DA/RA Electro Pneumatic (SMART WITH FAIL FREEZE FACILITY)# ☑
39. If Electronic : Type :
Model : Solid plate deversing contactors
Main contactor : Solid state thyristor: ☐
Relay Switching : ☐
Also refer annexure – II
position indicator reqd. for Valve & VCB

40. If Pneumatic : Type : SMART
Model : *
Split range : Yes ☐ No ☑
Controller Input & Output Signal Value : 4–20 mA
Air supply : 5 Kg/cm^2
Input/Output Pr. guage :
Required : Yes ☑ No ☐
By pass provision : Yes ☐ No ☑
Action : Direct ☐ Reverse ☐ Both ☑
Cam : =% ☐ Linear ☐ Both ☐

ACCESSORIES:

41. Handwheel : Yes ☑ Side ☑ Top ☐
42. Air filter : Yes ☑ No ☐
Filter Size : 5 Micron ☑ 25 Micron ☐
43. Limit Switches : Yes ☑ No ☐
Qty. : 1 at full open &
: 1 at full close
Rating : 240v. 5Amp. ac
No of contacts per switch : 2No + 2NC
44. Solenoid valve to effect
Stayput : Yes ☑ No ☐
Type : 3 Way universal : Yes ☑ No ☐
Rating : 24V DC 2 wire
Class H coil : Yes ☑ No ☐
45. Vol. booster : Yes ☐ No ☑
46. Travel time : < 10 sec
47. Installation : Indoor ☐ Outdoor ☑
48. All accessories enclosure : IP65$

49. Isolated Position transmitter : Yes ☐ No ☑
Type : Pnuematic : ☐ Electronic Non contact type ☐
Rating : 2 wire 24V DC: ☐ ☐
Output : 4–20 ma : ☐ 3–15 paig ☐
50. Torque Switches : Yes ☐ No ☑
Qty. :
Rating :
51. Air lock : Yes ☑ No ☐
Function : TO EFFECT STAYPUT
Type * : 3 Way single acting ☐
: 3 Way double acting ☐
52. Ambience : Dusty corrosive ☑
Toxic hazardous : ☐ ☐
53.1. Local position Indicator : Required.
53.2. Integral JB : 36 Way JB required
53.3. All electrical terminating : plug & socket type

MISCELLANEOUS:

54. Seat leakage : FCI 70.2 class ☑ CLASS IV$
I.S.A : ☐ ☐
55. Approx. weight (total) : *
56. Space requirements for online servicing : *

57. Valve sizing as per ISA 75.01 : Yes ☑ No ☐
58. Noise Level : Less than 85 DBA at 1m from Valve & Piping System.
59. Intertubing Diagram : As per Enclosed.
60. Performance Data
Linearity : ± 1 % Hyterisis : ± 0.5 %
Sensitivity : ± 0.5 % Accuracy (overall) : ± 2 %

VALVE SIZING DATA:

61. Medium : SH Steam ☑ Sat. Steam ☐
Water ☐
62. Flow rate in T/Hr
63. Operating inlet pressure in Kg/cm^2 (a)
64. Operating inlet temperature in °C
65. Outlet pressure in Kg/cm^2 (a)
66. Viscosity : --
67. Operating (required) Cv
68. Operating noise level at 1.0 metre from valve surface
69. Outlet velocity

CONDITION				
1	2	3	4	5
REFER DRAWING No. 4–00–306–40689 FOR VALVE SIZING DATA				

REFER STANDARD TABLE

<85	dba	(for all conditions)		

DATE	PREPARED	APPD/MECH	APPD/C&I
20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40693 REV 00

DESIGN DATA:

70. Design Pressure Kg/cm^2 (g) : 58.1 Kg/Cm^2 (g)
71. Design Temperature °C : 360 °C
72. Rated/Design/Selected Cv of valve : *
73. Velocity restriction : *
74. Operating lift restriction : 10 to 80 %$.

Stem travel range from min. flow to max.flow shall be around 50% of the total stem travel.

75. lift at various operating Conditions 1 TO 6 : *
76. Down stream limitations : *
77. Up stream limitations : *
78. Increase in signal Air : To open the Valve

TESTING/INSPECTION:

79. Hydraulic test report : Yes ☑ No ☐
80. Radiography : Critical Parts : ☑ Total ☐
Not required : ☐ ☐
81. IBR test report : Reqd. : ☑ ☐
82. Type test :*
Cv capacity test procedure as per ISA75.02: Required
83. Valve functional test : Yes ☑ No ☐

* Type test to be done atleast for one no on this consignment.

84. Accessories functional : Yes ☑ No ☐
Test :
85. Seat leakage test : Yes ☑ No ☐
86. Material test report : Yes ☑ No ☐
87. Customer Inspection :
In process : Yes ☑ No ☐
Final : Yes ☑ No ☐
88. Third Party inspection : Yes ☐ No ☐

DOCUMENTATION: (Required)

89. With bid. (3 sets)
Catalogues : Yes ☑ No ☐
Dimensional drawing : Yes ☑ No ☐
All data sheets : Yes ☑ No ☐
Recommendation / Limitation : Yes ☑ No ☐
Confirmatory report : Yes ☑ No ☐
Contrary report : Yes ☑ No ☐
Deviation report : Yes ☑ No ☐
90. Quality plan : Yes ☑ No ☐

91. With equipment :
Dimensional drawing : 15 Sets + 1 CD
O & M : 15 Sets + 1 CD
Data Sheets : 15 Sets + 1 CD
Test certificate : 03 Sets + 1 CD
92. Valve sizing, actuator sizing, noise level calculations required with bid(with formulae) : Yes ☑ No ☐
93. --

SPARES:

94. Commissioning spares : *
95. Mandatory spares : As per specification
96. 2/3 Years maintenance spares : *

OTHERS:

97. Bidders experience list : Required ☑ Not required ☐
98. Operational feed back of such valves supplied elsewhere : Required ☑ Not required ☐
99. Equipment guarantee : Required ☑ Not required ☐
100. System guarantee : Required ☑ Not required ☐
101. Service contract for 5 Years : – To quote seperately
102. Commissioning of the valves : Required ☐ Not required ☑

NOTES:

1. * DENOTES BIDDER TO SPECIFY
2. $ AS PER TENDER SPECIFICATION
3. # AFTER INSPECTION, SMART POSITIONER TO BE PACKED SEPARATELY ALONG WITH THE CONTROL VALVE AND MOUNTING ACCESSORIES. THE SAME WILL BE OPENED AND INSTALLED ONLY DURING COMMISSIONING.

20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA	DRG. NO: 4–00–306–40693	REV 00
DATE	PREPARED	APPD/MECH	APPD/C&I		

CI 12/A

CONTROL VALVE SPECIFICATION SHEET

(IN ACCORDANCE WITH I.S.A. FORM S20.51)

PROJECT: NEYVELI NEW TPP 2X500MW PROJECT
STEAM GENERATOR PACKAGE

CUST.No: 7232, 7233

GENERAL:THIS IS TO BE READ ALONG WITH TECHNICAL SPECIFICATION PC: TSP: APRDS: NEWNEYVELI

1. Valve tag No. : CDV–01
2. Service : Common Spray Block valve
3. Line No./Vessel No. :
4. Qty. required per unit : 1 No.
5. Manufacturer : *
6. Model No. : *
7. Rating : ASME CL.300
8. Total Qty Required : 2 Nos.

BODY:

9. Type : Thru ☑ 3 Way ☐ Z type ☐ Angle ☐ ☐
10. Form : Globe ☑ Ball ☐ Butterfly ☐ ☐
11. Size : *
12. Port Size : *
13. Connecting pipe size : Inlet : OD 60.3X5.54 Outlet : OD 60.3X5.54
14. Body rating : ASME CL.300
16. Bonnet type : Standard ☑ Finned ☐ Extended ☐ Pr. seal ☐ ☐
17. Material : Body : SA105/SA216WCB Packing : GRAFOIL Bolting : *
18. Flow direction : HORIZONTAL
19. Suitable matching pieces to match with pipe size specified shall be offered.

15. Type of end connections : Screwed ☐ NPI ☐ Flanged ☐ ANSI ☐ BW ☐ BSPT ☐ ☐ DIN ☐ SW ☑ BS ☐ ☐

TRIM:

20. No. of ports : *
21. Type : Balanced ☑ Unbalanced ☐
22. Plug characteristics: QUICK OPENING
23. Guiding : Cage ☑ Port ☐ Top ☐ Bottom ☐
24. Stem material :
25. Plug material :
26. Seat material :
27. Disc material :
28. stem guide material : } SS316 SST Strain Hardened OR EQUIVALENT
29. --

ACTUATOR:

30. Type : Electric ☐ Pneumatic ☑ Hydraulic ☐ DA/RA(Air To Close) ✓
31. Size : *
32. Supply : 5–8 Kg/cm^2 Shut off Pressure : 8 Kg/cm^2
33. Failsafe position of valve. : Stayput ☑ Full Close ☐ Full Open ☐
34. Diaphragm/Cylinder pressure at Valve full open : * Valve full close :
35. Force required for process & Force available at actuator. : *
36. Actuator sizing ΔP : *
37. If actuator electric fill in data sheet as per annexure furnished and shall comply with annexure–I specification. : NAPL

REV	DATE	ALTERATION	PREPARED	APPD/MECH	APPD/C&I
00	20.04.15	FRESH ISSUE	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40694 REV 00

POSITIONER: NOT REQUIRED

38. Type : Pneumatic ☐ Electronic ☐
DA/RA Electro Pneumatic ☐

39. If Electronic : Type :
Model : Solid plate deversing contactors
Main contactor : Solid state thyristor: ☐
Relay Switching : ☐
Also refer annexure – II
position indicator reqd. for Valve & VCB

40. If Pneumatic : Type : *
Model : *
Split range : Yes ☐ No ☐
Controller Input & Output Signal Value : 4–20 mA
Air supply : 45 PSIG
Input/Output Pr. guage :
Required : Yes ☐ No ☐
By pass provision : Yes ☐ No ☐
Action : Direct ☐ Reverse ☐ Both ☐
Cam : =% ☐ Linear ☐ Both ☐

ACCESSORIES:

41. Handwheel : Yes ☑ Side ☑ Top ☐
42. Air filter : Yes ☑ No ☐
Filter Size : 5 Micron ☑ 25 Micron ☐
43. Limit Switches : Yes ☑ No ☐
Qty. : 1 at full open &
: 1 at full close
Rating : 240v. 5Amp. ac
No of contacts per switch : 2No + 2NC
44. Solenoid valve as pilot device
Stayput : Yes ☐ No ☐
Type : 4 Way Dual coil Universal: Yes ☑ No ☐
Rating : 24V DC 2 wire
Class H coil : Yes ☑ No ☐
45. Vol. booster : Yes ☐ No ☑
46. Travel time : < 10 Sec.
47. Installation : Indoor ☐ Outdoor ☑
48. All accessories enclosure : IP65$

49. Position transmitter : Yes ☐ No ☑
Type : Pnuematic : ☐ Electronic Non contact type ☐
Rating : 2 wire 24V DC: ☐ ☐
Output : 4–20 ma : ☐ 3–15 paig ☐
50. Torque Switches : Yes ☐ No ☑
Qty. :
Rating :
51. Air lock : Yes ☑ No ☐
Function : TO EFFECT STAYPUT
Type * : 3 Way single acting ☐
: 3 Way double acting ☐
52. Ambience : Dusty corrosive ☑
Toxic hazardous : ☐ ☐
53.1. Local position Indicator : Required.
53.2. I/P converter with A/F regulator : Not Required
53.3 Integral JB : 36 Way JB required
53.4 All electrical terminating : plug & socket type

MISCELLANEOUS:

54. Seat leakage : ASME FCI/RP 70.2 ☑ CLASS IV$
I.S.A : ☐ ☐
55. Approx. weight (total) : *
56. Space requirements for online servicing : *

57. Valve sizing as per ISA 75.01 : Yes ☑ No ☐
58. Noise Level : Less than 85 DBA at 1m from Valve & Piping System.
59. Intertubing Diagram : As per Enclosed.
60. Performance Data
Linearity : ± 1 % Hyterisis : ± 0.5 %
Sensitivity : ± 0.5 % Accuracy (overall) : ± 2 %

VALVE SIZING DATA:

61. Medium : SH Steam ☐ Sat. Steam ☐
Water ☑
62. Flow rate in T/Hr
63. Operating inlet pressure in Kg/cm^2 (a)
64. Operating inlet temperature in °C
65. Outlet pressure in Kg/cm^2 (a)
66. Viscosity : --
67. Operating (required) Cv
68. Operating noise level at 1.0 metre from valve surface
69. Outlet velocity

CONDITION				
1	2	3	4	5
REFER DRAWING No. 4–00–306–40690 AND 4–00–306–40692 FOR VALVE SIZING DATA				

REFER STANDARD TABLE

<85	dba	(for all conditions)		

DATE	PREPARED	APPD/MECH	APPD/C&I
20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40694 REV 00

DESIGN DATA:

70. Design Pressure Kg/cm^2(g) : 39 Kg/Cm ^{2}(g)
71. Design Temperature °C : 55
72. Rated/Design/Selected Cv of valve : *
73. Velocity restriction : *
74. Operating lift restriction : –
75. lift at various operating Conditions 1 TO 6 : *
76. Down stream limitations : *
77. Up stream limitations : *
78. Increase in signal Air : To open the Valve

TESTING/INSPECTION:

79. Hydraulic test report : Yes ☑ No ☐
80. Radiography : Critical Parts : ☑ Total ☐
Not required : ☐ ☐
81. IBR test report : Reqd. : ☑ ☐
82. Type test : *
Cv capacity test procedure as per ISA75.02: Required
83. Valve functional test : Yes ☑ No ☐
* Type test to be done atleast for one no on this consignment.
84. Accessories functional : Yes ☑ No ☐
Test :
85. Seat leakage test : Yes ☑ No ☐
86. Material test report : Yes ☑ No ☐
87. Customer Inspection :
In process : Yes ☑ No ☐
Final : Yes ☑ No ☐
88. Third Party inspection : Yes ☐ No ☐

DOCUMENTATION: (Required)

89. With bid. (3 sets)
Catalogues : Yes ☑ No ☐
Dimensional drawing : Yes ☑ No ☐
All data sheets : Yes ☑ No ☐
Recommendation / Limitation : Yes ☑ No ☐
Confirmatory report : Yes ☑ No ☐
Contrary report : Yes ☑ No ☐
Deviation report : Yes ☑ No ☐
90. Quality plan : Yes ☑ No ☐
91. With equipment :
Dimensional drawing : 15 Sets + 1 CD
O & M : 15 Sets + 1 CD
Data Sheets : 15 Sets + 1 CD
Test certificate : 03 Sets + 1 CD
92. Valve sizing, actuator sizing, noise level calculations required with bid(with formulae) : Yes ☑ No ☐
93. --

SPARES:

94. Commissioning spares : *
95. Mandatory spares : As per specification
96. 2/3 Years maintenance spares : *

OTHERS:

97. Bidders experience list : Required ☑ Not required ☐
98. Operational feed back of such valves supplied elsewhere : Required ☑ Not required ☐
99. Equipment guarantee : Required ☑ Not required ☐
100. System guarantee : Required ☑ Not required ☐
101. Service contract for 5 Years : – To quote seperately
102. Commissioning of the valves : Required ☐ Not required ☑

NOTES:

1. * DENOTES BIDDER TO SPECIFY
2. $ AS PER TENDER SPECIFICATION

20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA	DRG. NO: 4–00–306–40694	REV 00
DATE	PREPARED	APPD/MECH	APPD/C&I		

CI 12/A

CONTROL VALVE SPECIFICATION SHEET

(IN ACCORDANCE WITH I.S.A. FORM S20.51)

PROJECT: NEYVELI NEW TPP 2X500MW PROJECT
STEAM GENERATOR PACKAGE

CUST.No: 7232, 7233

GENERAL:THIS IS TO BE READ ALONG WITH TECHNICAL SPECIFICATION PC: TSP: APRDS: NEWNEYVELI

1. Valve tag No. : CDV–03
2. Service : High capacity Spray Control valve
3. Line No./Vessel No. :
4. Qty. required per unit : 1 No.
5. Manufacturer : *
6. Model No. : *
7. Rating : ASME CL. 300
8. Total Qty Required : 2 Nos.

BODY:

9. Type : Thru ☑ 3 Way ☐ Z type ☐ Angle ☐ ☐
10. Form : Globe ☑ Ball ☐ Butterfly ☐ ☐
11. Size : *
12. Port Size : *
13. Connecting pipe size : Inlet : OD 48.3X5.08 Outlet : OD 48.3X5.08
14. Body rating : ASME CL.300
16. Bonnet type : Standard ☑ Finned ☐ Extended ☐ Pr. seal ☐ ☐
17. Material : Body : SA105/SA216WCB Packing: GRAFOIL Bolting : *
18. Flow direction : HORIZONTAL
19. Suitable matching pieces to match with pipe/bold size specified shall be offered.

15. Type of end connections : Screwed ☐ NPI ☐ Flanged ☐ ANSI ☐ BW ☐ BSPT ☐ ☐ DIN ☐ SW ☑ BS ☐ ☐

TRIM: MULTI STAGE, LOW RECOVERY / *

20. No. of ports : *
21. Type : Balanced ☑ Unbalanced ☐
22. Plug characteristics: ~~L/LV~~/EP / ~~MODIFIED EP~~
23. Guiding : Cage ☑ Port ☐ Top ☐ Bottom ☐
24. Stem material :
25. Plug material :
26. Seat material :
27. Disc material :
28. stem guide material : } SS316 SST Strain Hardened OR EQUIVALENT
29. --

ACTUATOR:

30. Type : Electric ☐ Pneumatic ☑ Hydraulic ☐ DA/RA(Air To Close)
31. Size : *
32. Supply : 5–8 Kg/cm^2 Shut off Pressure : 8 Kg/cm^2
33. Failsafe position of valve. : Stayput ☑ Full Close ☐ Full Open ☐
34. Diaphragm/Cylinder pressure at Valve full open : * Valve full close :
35. Force required for process & Force available at actuator. : *
36. Actuator sizing ΔP : *
37. If actuator electric fill in data sheet as per annexure furnished and shall comply with annexure–I specification. : NAPL

REV	DATE	ALTERATION	PREPARED	APPD/MECH	APPD/C&I
00	20.04.15	FRESH ISSUE	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40696 REV 00

POSITIONER:

38. Type : Pneumatic ☐ Electronic ☐
DA/RA ☐ Electro Pneumatic (SMART WITH FAIL FREEZE FACILITY)# ☑
39. If Electronic : Type :
Model : Solid plate deversing contactors
Main contactor : Solid state thyristor: ☐
Relay Switching : ☐
Also refer annexure – II
position indicator reqd. for Valve & VCB

40. If Pneumatic : Type : SMART
Model : *
Split range : Yes ☐ No ☑
Controller Input & Output Signal Value : 4–20 mA
Air supply : 5 Kg/cm^2
Input/Output Pr. guage :
Required : Yes ☑ No ☐
By pass provision : Yes ☐ No ☑
Action : Direct ☐ Reverse ☐ Both ☑
Cam : =% ☐ Linear ☐ Both ☐

ACCESSORIES:

41. Handwheel : Yes ☑ Side ☑ Top ☐
42. Air filter : Yes ☑ No ☐
Filter Size : 5 Micron ☑ 25 Micron ☐
43. Limit Switches : Yes ☑ No ☐
Qty. : 1 at full open &
: 1 at full close
Rating : 240v. 5Amp. ac
No of contacts per switch : 2No + 2NC
44. Solenoid valve to effect
Stayput : Yes ☑ No ☐
Type : 3 Way universal : Yes ☑ No ☐
Rating : 24V DC 2 wire
Class H coil : Yes ☑ No ☐
45. Vol. booster : Yes ☐ No ☑
46. Travel time : < 10 sec
47. Installation : Indoor ☐ Outdoor ☑
48. All accessories enclosure : IP65$

49. Isolated Position transmitter : Yes ☐ No ☑
Type : Pnuematic : ☐ Electronic Non contact type ☐
Rating : 2 wire 24V DC: ☐ ☐
Output : 4–20 ma : ☐ 3–15 paig ☐
50. Torque Switches : Yes ☐ No ☑
Qty. :
Rating :
51. Air lock : Yes ☑ No ☐
Function : TO EFFECT STAYPUT
Type : 3 Way single acting ☐
: 3 Way double acting ☐
52. Ambience : Dusty corrosive ☑
Toxic hazardous : ☐ ☐
53.1. Local position Indicator : Required.
53.2. Integral JB : 36 Way JB required
53.3. All electrical terminating : plug & socket type

MISCELLANEOUS:

54. Seat leakage : FCI 70.2 class ☑ CLASS IV$
I.S.A : ☐ ☐
55. Approx. weight (total) : *
56. Space requirements for online servicing : *

57. Valve sizing as per ISA 75.01 : Yes ☑ No ☐
58. Noise Level : Less than 85 DBA at 1m from Valve & Piping System.
59. Intertubing Diagram : As per Enclosed.
60. Performance Data
Linearity : ± 1 % Hyterisis : ± 0.5 %
Sensitivity : ± 0.5 % Accuracy (overall) : ± 2 %

VALVE SIZING DATA:

61. Medium : SH Steam ☐ Sat. Steam ☐
Water ☑
62. Flow rate in T/Hr
63. Operating inlet pressure in Kg/cm^2 (a)
64. Operating inlet temperature in °C
65. Outlet pressure in Kg/cm^2 (a)
66. Viscosity : --
67. Operating (required) Cv
68. Operating noise level at 1.0 metre from valve surface
69. Outlet velocity

CONDITION				
1	2	3	4	5
REFER DRAWING No. 4–00–306–40692 FOR VALVE SIZING DATA				

REFER STANDARD TABLE

<85	dba	(for all conditions)		

DATE	PREPARED	APPD/MECH	APPD/C&I
20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40696 REV 00

DESIGN DATA:

70. Design Pressure Kg/cm^2(g) : 39 Kg/Cm^2 (g)
71. Design Temperature °C : 55 °C
72. Rated/Design/Selected Cv of valve : *
73. Velocity restriction : *
74. Operating lift restriction : 10 to 80 %$.

Stem travel range from min. flow to max.flow shall be around 50% of the total stem travel.

75. lift at various operating Conditions 1 TO 6 : *
76. Down stream limitations : *
77. Up stream limitations : *
78. Increase in signal Air : To open the Valve

TESTING/INSPECTION:

79. Hydraulic test report : Yes ☑ No ☐
80. Radiography : Critical Parts : ☑ Total ☐
Not required : ☐ ☐
81. IBR test report : Reqd. : ☑ ☐
82. Type test : *
Cv capacity test procedure as per ISA75.02: Required
83. Valve functional test : Yes ☑ No ☐

* Type test to be done atleast for one no on this consignment.

84. Accessories functional : Yes ☑ No ☐
Test :
85. Seat leakage test : Yes ☑ No ☐
86. Material test report : Yes ☑ No ☐
87. Customer Inspection :
In process : Yes ☑ No ☐
Final : Yes ☑ No ☐
88. Third Party inspection : Yes ☐ No ☐

DOCUMENTATION: (Required)

89. With bid. (3 sets)
Catalogues : Yes ☑ No ☐
Dimensional drawing : Yes ☑ No ☐
All data sheets : Yes ☑ No ☐
Recommendation / Limitation : Yes ☑ No ☐
Confirmatory report : Yes ☑ No ☐
Contrary report : Yes ☑ No ☐
Deviation report : Yes ☑ No ☐
90. Quality plan : Yes ☑ No ☐

91. With equipment :
Dimensional drawing : 15 Sets + 1 CD
O & M : 15 Sets + 1 CD
Data Sheets : 15 Sets + 1 CD
Test certificate : 03 Sets + 1 CD
92. Valve sizing, actuator sizing, Cavitation check, noise level calculations required with bid(with formulae) : Yes ☑ No ☐
93. --

SPARES:

94. Commissioning spares : *
95. Mandatory spares : As per specification

96. 2/3 Years maintenance spares : *

OTHERS:

97. Bidders experience list	:	Required	☑	Not required	☐
98. Operational feed back of such valves supplied elsewhere	:	Required	☑	Not required	☐
99. Equipment guarantee	:	Required	☑	Not required	☐
100. System guarantee	:	Required	☑	Not required	☐
101. Service contract for 5 Years	: – To quote seperately				
102. Commissioning of the valves	:	Required	☐	Not required	☑

NOTES:

1. * DENOTES BIDDER TO SPECIFY
2. $ AS PER TENDER SPECIFICATION
3. # AFTER INSPECTION, SMART POSITIONER TO BE PACKED SEPARATELY ALONG WITH THE CONTROL VALVE AND MOUNTING ACCESSORIES. THE SAME WILL BE OPENED AND INSTALLED ONLY DURING COMMISSIONING.

20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA	DRG. NO: 4–00–306–40696	REV 00
DATE	PREPARED	APPD/MECH	APPD/C&I		

CI 12/A

CONTROL VALVE SPECIFICATION SHEET

(IN ACCORDANCE WITH I.S.A. FORM S20.51)

PROJECT: NEYVELI NEW TPP 2X500MW PROJECT
STEAM GENERATOR PACKAGE

CUST.No: 7232, 7233

GENERAL:THIS IS TO BE READ ALONG WITH TECHNICAL SPECIFICATION PC: TSP: APRDS: NEWNEYVELI

1. Valve tag No. : CDV–10
2. Service : Low capacity Spray Control valve
3. Line No./Vessel No. :
4. Qty. required per unit : 1 No.
5. Manufacturer : *
6. Model No. : *
7. Rating : ASME Cl 300
8. Total Qty Required : 2 Nos.

BODY:

9. Type : Thru ☑ 3 Way ☐ Z type ☐ Angle ☐ ☐
10. Form : Globe ☑ Ball ☐ Butterfly ☐ ☐
11. Size : *
12. Port Size : *
13. Connecting pipe size : Inlet : OD 48.3 x 5.08 Outlet : OD 48.3 x 5.08
14. Body rating : ASME Cl 300
16. Bonnet type : Standard ☑ Finned ☐ Extended ☐ Pr. seal ☐ ☐
17. Material : Body : SA105/SA216WCB Packing: GRAFOIL Bolting : *
18. Flow direction : HORIZONTAL
19. Suitable matching pieces to match with pipe size specified shall be offered.

15. Type of end connections : Screwed ☐ NPI ☐ Flanged ☐ ANSI ☐ BW ☐ BSPT ☐ ☐ DIN ☐ SW ☑ BS ☐ ☐

TRIM: MULTI STAGE, LOW RECOVERY / *

20. No. of ports : *
21. Type : Balanced/Unbalanced
22. Plug characteristics: L/LV/EP/MODIFIED EP
23. Guiding : Cage ☑ Port ☐ Top ☐ Bottom ☐
24. Stem material :
25. Plug material :
26. Seat material :
27. Disc material :
28. stem guide material :

SS316 SST Strain Hardened OR EQUIVALENT

29. --

ACTUATOR:

30. Type : Electric ☐ Pneumatic ☑ Hydraulic ☐ DA/RA(Air To Close) ✓
31. Size : *
32. Supply : 5–8 Kg/cm^2 Shut off Pressure : 8 Kg/cm^2
33. Failsafe position of valve. : Stayput ☑ Full Close ☐ Full Open ☐
34. Diaphragm/Cylinder pressure at Valve full open : * Valve full close :
35. Force required for process & Force available at actuator. : *
36. Actuator sizing ΔP : *
37. If actuator electric fill in data sheet as per annexure furnished and shall comply with annexure–I specification. : NAPL

REV	DATE	ALTERATION	PREPARED	APPD/MECH	APPD/C&I
00	20.04.15	FRESH ISSUE	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40697 REV 00

POSITIONER:

38. Type : Pneumatic ☐ Electronic ☐

DA/RA

Electro Pneumatic (SMART WITH FAIL FREEZE FACILITY)# ☑

39. If Electronic : Type :

Model : Solid plate deversing contactors

Main contactor : Solid state thyristor: ☐

Relay Switching : ☐

Also refer annexure – II

position indicator reqd. for Valve & VCB

40. If Pneumatic : Type : SMART

Model : *

Split range : Yes ☐ No ☑

Controller Input & Output Signal Value : 4–20 mA

Air supply : 5 Kg/cm^2

Input/Output Pr. guage :

Required : Yes ☑ No ☐

By pass provision : Yes ☐ No ☑

Action : Direct ☐ Reverse ☐ Both ☑

Cam : =% ☐ Linear ☐ Both ☐

ACCESSORIES:

41. Handwheel : Yes ☑ Side ☑ Top ☐

42. Air filter : Yes ☑ No ☐

Filter Size : 5 Micron ☑ 25 Micron ☐

43. Limit Switches : Yes ☑ No ☐

Qty. : 1 at full open &
: 1 at full close

Rating : 240v. 5Amp. ac

No of contacts per switch : 2No + 2NC

44. Solenoid valve as

Stayput : Yes ☑ No ☐

Type : 3 Way universal : Yes ☑ No ☐

Rating : 24V DC 2 wire

Class H coil : Yes ☑ No ☐

45. Vol. booster : Yes ☐ No ☑

46. Travel time : < 10 sec

47. Installation : Indoor ☐ Outdoor ☑

48. All accessories enclosure : IP65$

49. Isolated Position transmitter : Yes ☐ No ☑

Type : Pnuematic : ☐ Electronic Non contact type ☐

Rating : 2 wire 24V DC: ☐ ☐

Output : 4–20 ma : ☐ 3–15 paig ☐

50. Torque Switches : Yes ☐ No ☑

Qty. :

Rating :

51. Air lock : Yes ☑ No ☐

Function : TO EFFECT STAYPUT

Type * : 3 Way single acting ☐

: 3 Way double acting ☐

52. Ambience : Dusty corrosive ☑

Toxic hazardous : ☐ ☐

53.1. Local position Indicator : Required.

53.2. Integral JB : 36 Way JB required

53.3. All electrical terminating : plug & socket type

MISCELLANEOUS:

54. Seat leakage : FCI 70.2 class ☑ CLASS IV$

I.S.A : ☐ ☐

55. Approx. weight (total) : *

56. Space requirements for online servicing : *

57. Valve sizing as per ISA 75.01 : Yes ☑ No ☐

58. Noise Level : Less than 85 DBA at 1m from Valve & Piping System.

59. Intertubing Diagram : As per Enclosed.

60. Performance Data

Linearity : ± 1 % Hyterisis : ± 0.5 %

Sensitivity : ± 0.5 % Accuracy (overall) : ± 2 %

VALVE SIZING DATA:

61. Medium : SH Steam ☐ Sat. Steam ☐

Water ☑

62. Flow rate in T/Hr

63. Operating inlet pressure in Kg/cm^2 (a)

64. Operating inlet temperature in °C

65. Outlet pressure in Kg/cm^2 (a)

66. Viscosity : --

67. Operating (required) Cv

68. Operating noise level at 1.0 metre from valve surface

69. Outlet velocity

CONDITION				
1	2	3	4	5
REFER DRAWING No. 4–00–306–40690 FOR VALVE SIZING DATA				

REFER STANDARD TABLE

<85	dba	(for all conditions)		

DATE	PREPARED	APPD/MECH	APPD/C&I
20.04.2015	E.KRITHIGA	C.SARAVANAN	R.PRABA

DRG. NO: 4–00–306–40697 REV 00

DESIGN DATA:

70. Design Pressure Kg/cm^2(g) : 39 Kg/Cm^2 (g)
71. Design Temperature °C : 55 °C
72. Rated/Design/Selected Cv of valve : *
73. Velocity restriction : *
74. Operating lift restriction : 10 to 80 %$.
    Stem travel range from min. flow to max.flow shall be around 50% of the total stem travel.
75. lift at various operating Conditions 1 TO 6 : *
76. Down stream limitations : *
77. Up stream limitations : *
78. Increase in signal Air : To open the Valve

TESTING/INSPECTION:

79. Hydraulic test report : Yes ☑ No ☐
80. Radiography : Critical Parts : ☑ Total ☐
    Not required : ☐ ☐
81. IBR test report : Reqd. : ☑ ☐
82. Type test : *
    Cv capacity test procedure as per ISA75.02: Required
83. Valve functional test : Yes ☑ No ☐

* Type test to be done atleast for one no on this consignment.

84. Accessories functional : Yes ☑ No ☐
    Test :
85. Seat leakage test : Yes ☑ No ☐
86. Material test report : Yes ☑ No ☐
87. Customer Inspection :
    In process : Yes ☑ No ☐
    Final : Yes ☑ No ☐
88. Third Party inspection : Yes ☐ No ☐

DOCUMENTATION: (Required)

89. With bid. (3 sets)
    Catalogues : Yes ☑ No ☐
    Dimensional drawing : Yes ☑ No ☐
    All data sheets : Yes ☑ No ☐
    Recommendation / Limitation : Yes ☑ No ☐
    Confirmatory report : Yes ☑ No ☐
    Contrary report : Yes ☑ No ☐
    Deviation report : Yes ☑ No ☐
90. Quality plan : Yes ☑ No ☐

91. With equipment :
    Dimensional drawing : 15 Sets + 1 CD
    O & M : 15 Sets + 1 CD
    Data Sheets : 15 Sets + 1 CD
    Test certificate : 03 Sets + 1 CD
92. Valve sizing, actuator sizing, Cavitation check, noise level calculations required with bid(with formulae) : Yes ☑ No ☐
93. --

SPARES:

94. Commissioning spares : *
95. Mandatory spares : As per specification
96. 2/3 Years maintenance spares : *

OTHERS:

97. Bidders experience list : Required ☑ Not required ☐
98. Operational feed back of such valves supplied elsewhere : Required ☑ Not required ☐
99. Equipment guarantee : Required ☑ Not required ☐
100. System guarantee : Required ☑ Not required ☐
101. Service contract for 5 Years : – To quote seperately
102. Commissioning of the valves : Required ☐ Not required ☑

NOTES:

1. * DENOTES BIDDER TO SPECIFY
2. $ AS PER TENDER SPECIFICATION
3. # AFTER INSPECTION, SMART POSITIONER TO BE PACKED SEPARATELY ALONG WITH THE CONTROL VALVE AND MOUNTING ACCESSORIES. THE SAME WILL BE OPENED AND INSTALLED ONLY DURING COMMISSIONING.

20.04.2015	E.KRITHIGA	C.SARAVANAN	R.PRABA	DRG. NO: 4-00-306-40697	REV 00
DATE	PREPARED	APPD/MECH	APPD/C&I		

L.T. DESUPERHEATER SPECIFICATION SHEET

01.	Designation/Tag No	: Auxiliary steam line / DESH – 1
02.	Quantity Required per unit	: One
03.	Turndown ratio	: Bidder to specify
04.	Material	: ASTM A 106 Gr B
05.	Inlet connection/Outlet connection (Steam side)	: ø406.4 x 9.53 } d1 shall be as per Sty 'D'; ø406.4 x 9.53 } d1=387.34 Suitable matching pieces to match with pipe/bold size specified shall be offered.
06.	End connection (Steam side)	: Butt Welded
07.	Spray water connection	: OD 48.3 x 5.08
08.	End connection (Spray side)	: Butt Welded / Socket Welded
09.	Mounting arrangement	: Horizontal; Vertical is not accepted
10.	Minimum straight length required U/S of Desuperheater	: Bidder to specify.
11.	Minimum distance required downstream of DSH	: Bidder to specify.
12.	Sizing Parameters	: Refer Drg. No. 4–00–306–40690
13 .	Design Pressure	: 20 Kg / cm^2 (g)
14.	Design Temperature	: 350 °C
15.	Minimum distance required in D/S of DESH for temp. control sensing element	: Bidder to specify.
16.	Minimum distance required in D/S of DESH for pressure control sensing element	: Bidder to specify.
17.	IBR Certification required	: Yes
18.	Testing/Inspection	: As per purchaser approved vendor QP

19. Documents required during offer :

Catalogues, filled up data sheets, Sizing calculations, Turn down ration calculation, Detailed drawing with BOM, Material specifications, Weight, Special requirements such as Liner, Upstream & Downstream straight length, O & M manual. Quality plan indicating various checks for raw material in process & final inspection stage.

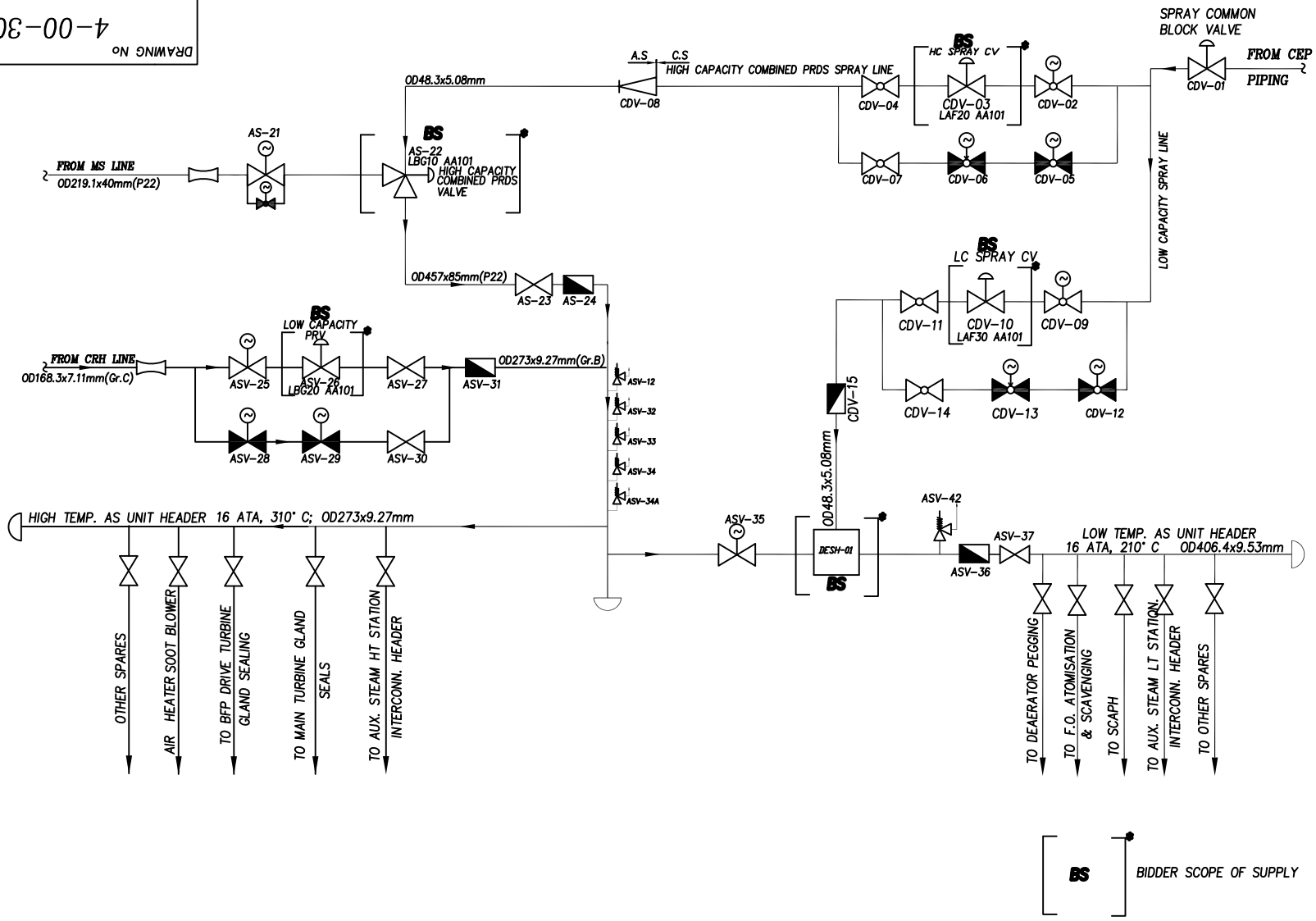
20. Documents required after Placement of Order

Catalogues, Final detailed drawing with BOM, Material specification, Weight,Final sizing, Turn down ratio calculation, Testcertificates as per QP and O & M manual. } 20 sets plus 2 sets on CD

20.04.15	E.KRITHIGA	C.SARAVANAN	R.PRABA	DRG. NO: 4–00–306–40695	REV 00
DATE	PREPARED	APPD/MECH	APPD/C&I		

FIRST ANGLE PROJECTION(ALL DIMENSIONS IN MILLIMETRES)

DRAWING No 4-00-306-40800



CUST.NO: 7232 & 7233

NEYVELI LIGNITE CORPORATION LIMITED

NEYVELI NEW THERMAL POWER PROJECT(NNTPP)

2X500MW LIGNITE FIRED UNITS AT NEYVELI

DRAWN	CHECKED	APPROVED	DATE
E.KRITHIGA	C.SARAVANAN	R.PRABA	03.11.2015

TITLE: AUX. PRDS STATION SCHEME

DRAWING No: 4-00-306-40800/00

SIZE A4

CUST. No: 7232, 7233

NEYVELI NEW TPP 2X500MW PROJECT

STEAM GENERATOR PACKAGE

LOW CAPACITY PRV SIZING DATA (ASV-26)

S.No.	MEDIUM : SH STEAM		CONDITION					
			1	2	3	4		
			CASE 3 @40% LOAD	CASE 3 @100% LOAD	CASE 4 @100% LOAD	CASE 8 @40% LOAD		
01	STEAM FLOW RATE	T/Hr.	49.54	50.61	54.81	62.73		
02	STEAM OPERATING INLET PR.	$Kg/cm^2(a)$	18.29	43.67	43.67	18.29		
03	STEAM OPERATING INLET TEMP.	°C	331.5	331.4	331.4	331.5		
04	STEAM OUTLET PRESSURE	$Kg/cm^2(a)$	16 +Δp DSH	16 +Δp DSH	16 +Δp DSH	16 +Δp DSH		
05	STEAM OUTLET TEMP.	°C	329.21	301.34	301.34	329.21		
06	Cv REQUIRED (STEAM)		*	*	*	*		
07	OPERATING NOISE LEVEL AT 1.0 METRE		*	*	*	*		
08	OUTLET VELOCITY		*	*	*	*		

NOTES:- 1. Δp DSH → STEAM SIDE Δp ACROSS L.T.DESUPERHEATER

2. * BIDDER TO SPECIFY

PREPARED	APPROVED/MECH	APPROVED/C&I	DATE	DRG.No.	SH. 1 OF 1	REV.
E.KRITHIGA	C.SARAVANAN	R.PRABA	20.04.15	4-00-306-40689		00

NEYVELI NEW TPP 2X500MW PROJECT

CUST. No: 7232, 7233

STEAM GENERATOR PACKAGE

SIZING DATA FOR LT DESUPERHEATER, CDV-01 & CDV-10

S.No.	MEDIUM : SH STEAM		CONDITION									REMARKS
			1	2	3	4	5	6	7	8	9	
			CASE 1	CASE 2	CASE 3 @40%	CASE 3 @100%	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	
01	STEAM FLOW RATE INLET	T/Hr.	88.89	63.9	49.24	50.31	50.31	127.95	98.69	63.9	54.83	
02	STEAM OPERATING INLET PR.	$Kg/cm^2(a)$	16 +dp DSH	16 +dp DSH	16 +dp DSH	16 +dp DSH	16 +dp DSH	16 +dp DSH	16 +dp DSH	16 +dp DSH	16 +dp DSH	
03	STEAM OPERATING INLET TEMP.	°C	310.0	310.0	329.21	301.34	301.34	310.0	310.0	310.0	329.21	

S.No.	MEDIUM : SPRAY WATER		CONDITION									REMARKS
			1	2	3	4	5	6	7	8	9	
			CASE 1	CASE 2	CASE 3 @40%	CASE 3 @100%	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	
04	SPRAY FLOW RATE	T/Hr.	8.21	5.9	5.36	4.29	4.29	11.85	9.11	5.90	5.97	
05	SPRAY PR AT BLOCK VALVE INLET	$Kg/cm^2(a)$	31.0	28.0	26.0	26.0	26.0	26.0	31.0	28.0	26.0	
06	SPRAY INLET TEMP.	°C	47.7	47.7	49.9	49.9	49.9	49.9	47.7	47.7	49.9	
07	STEAM OUTLET FLOW RATE	T/Hr.	97.1	69.8	54.6	54.6	54.6	139.8	107.8	69.8	60.8	
08	STEAM OUTLET PRESSURE	$Kg/cm^2(a)$	16	16	16	16	16	16	16	16	16	
09	STEAM OUTLET TEMP.	°C	210	210	210	210	210	210	210	210	210	

NOTES: -

1. dp DSH→← STEAM SIDE dp ACROSS L.T.DESUPERHEATER
2. PRESSURE INDICATED ARE AT INLET OF SPRAY BLOCK VALVE.
3. THE PRESSURE DROP FROM INLET OF BLOCK VALVE (CDV-01) TO BE SUITABLY APPORTIONED BETWEEN SPRAY BLOCK VALVE CDV-01, CDV-10 & DESH-01(LT DESUPERHEATER.)
4. THE OUTLET PRESSURE OF CDV-10 SHALL CORRESPONDS TO SPRAY INLET PRESSURE OF DESH-01 (LT DESUPERHEATER.)
5. THIS TO BE READ IN CONJUCTION WITH DRG. 4-00-306-40694 FOR ADDITIONAL DATA FOR BLOCK VALVE SIZING CDV-01.

PREPARED	APPROVED/MECH	APPROVED/C&I	DATE	DRG.No.	SH. 1 OF 1	REV.
E.KRITHIGA	C.SARAVANAN	PRABA	20.04.2015	4-00-306-40690		00

CUST. No: 7232 & 7233

NEYVELI NEW TPP 2X500MW PROJECT

STEAM GENERATOR PACKAGE

COMBINED PRDS VALVE SIZING DATA (ASV-22)

S.No.	MEDIUM : SH STEAM		CONDITION					REMARKS
			1	2	3	4	5	
			CASE 1	CASE 2	CASE 5	CASE 6	CASE 7	
01	STEAM FLOW RATE INLET	T/Hr.	105.93	64.92	130.52	116.41	89.68	
02	STEAM OPERATING INLET PR.	$Kg/cm^2(a)$	40.7	112	178	83.6	68.3	
03	STEAM OPERATING INLET TEMP.	°C	345	500	540	460	385	

S.No.	MEDIUM : SPRAY WATER		CONDITION					REMARKS
			1	2	3	4	5	
			CASE 1	CASE 2	CASE 5	CASE 6	CASE 7	
04	SPRAY WATER FLOW RATE	T/Hr.	0.86	6.88	15.33	9.67	2.12	
05	SPRAY WATER OPERATING PR. AT BLOCK VALVE INLET	$Kg/cm^2(a)$	31	28	26	31	28	
06	SPRAY WATER OPERATING INLET TEMP.	°C	47.7	47.7	49.9	47.7	47.7	
07	STEAM OUTLET PRESSURE	$Kg/cm^2(a)$	16 +Δp DSH	16 +Δp DSH	16 +Δp DSH	16 +Δp DSH	16 +Δp DSH	
08	STEAM OUTLET TEMP.	°C	310	310	310	310	310	
09	Cv REQUIRED		*	*	*	*	*	
10	OPERATING NOISE LEVEL AT 1.0 METRE		<85dbA	<85dbA	<85dbA	<85dbA	<85dbA	
11	OUTLET VELOCITY		*	*	*	*	*	

NOTES:-

1. THIS SIZING TABLE TO BE USED FOR VALVE ASV-22, SPRAY BLOCK VALVE (TAG No.CDV-01), HC SPRAY CV (TAG No.CDV-03).
2. * BIDDER TO SPECIFY
3. Δp DSH → STEAM SIDE Δp ACROSS L.T.DESUPERHEATER

PREPARED	APPD/MECH	APPD/C&I	DATE	DRG.No.		REV.
E.KRITHIGA	C.SARAVANAN	R.PRABA	20.04.15	4-00-306-40692	SH. 1 OF 1	00

B. Control Valve Design & Sizing

1. The design of all valve bodies shall meet the specification requirements and shall conform to the requirements of ANSI for dimensions, material thickness and material specification for their respective pressure classes.

2. The valve sizing shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve travel. All the valves shall be capable of handling at least 120% of the required maximum flow. Further, the valve stem travel range from minimum flow condition to maximum flow condition shall not be less than 50% of the total valve stem travel. The sizing shall be in accordance with the latest edition of ISA Handbook on control valves. While deciding the size of valves, Supplier shall ensure that valves outlet velocity does not exceed 8 m / sec. for liquid services, 150 m/sec. for steam services and 50% of sonic velocity for flashing services. Supplier shall furnish the sizing calculations clearly indicating the outlet velocity achieved with the valve size selected by him as well as noise calculations, which will be subject to Consultant's / Owner's approval during detailed engineering.

3. Control valves for steam and water applications shall be designed to prevent cavitations, wire drawing, flashing on the downstream side of valve and down stream piping. Thus for cavitations / flashing service, only valve with anti-cavitations trim shall be provided. Detailed calculations to establish whether cavitations will occur or not for any given application shall be furnished.

4. Trim shall be multistage type having sufficient number of discrete pressure drop turns (stages) to ensure elimination of vibration, erosive – action, cavitations. Bidder shall identity the number of pressure drop turns in proposed equipment and shall also provide calculation demonstrating compliance to the trim exit velocity.

5. To prevent flow induced vibration and to protect the valve internals from foreign particles such as weld slag flow, direction shall be a flow to close (over the plug) configuration for liquid applications. To maximize noise attenuating benefits and to allow for constant fluid expansion, flow direction will be under the plug for steam and gas applications.

6. Control valves for application such as SH spray control, RH spray control, Heavy oil pressuring & control system shall have permissible leakage rate as per leakage class V. All other control valves such as low and high range feed control valves etc shall have leakage rate as per leakage class IV.

7. The control valve induced noise shall be limited to 85 dBA at 1 meter from the valve surface under actual operating conditions. The noise abatement shall be achieved by valve body and trim design and not by use of silencers.

8. The characteristic of the control valves shall be determined based on the application / service.
9. On supply air or electrical failure for pneumatic / electrical drive, the valve shall remain full closed, open or stay – put position as per process safety requirement.

C. Valve Construction

1. Proper selection of valve type and material of construction to meet operating requirement.
2. All valves shall be of globe body design and straightaway pattern with single or double port unless otherwise recommended by the manufacturer to be of angle body type. Rotary valve may alternatively be offered when pressure or pressure drops permit.
3. Valves with high lift cage guided plugs & quick charge trims shall be supplied.
4. Cast iron valves are not acceptable.
5. Bonnet joints for all control valves shall be of the flanged and bolted type for easy dis – assembly. Bonnet joints of internal threaded or union type will not be acceptable.
6. Plug shall be of one – piece construction either cast, forged or machined from solid bar stock. Plug shall be screwed and pinned to valve stems or shall be integral with the valve stems.
7. All valves connected to vacuum on down stream side shall be provided with packing suitable for vacuum applications (e.g. double vee type chevron packing).
8. Valve characteristic shall match with the process characteristics.
9. Extension bonnets shall be provided when the maximum temperature of flowing fluid is greater than 280 *C.
10. Flanged valves shall be rated at not less then ANSI pressure class of 300 lbs.
11. Teflon shall be used for valve gland packing to suit process requirement.
12. The valve body shall be marked to show direction of flow.

D. Valve Materials

1. The control valve body material shall be
   - Carbon steel as per ASTM – A216 GR WCB for non – corrosive, non – flashing and non – cavitations services below 275 deg c temperature like Auxiliary Steam flow to Deaerator, CRH flow to Deaerator, Condensate flow to Deaerator etc.
   - Alloy steel as per ASTM – A217 GR WC 9 for severe flashing / cavitations services like low load and full load feed water control, HP and LP heaters emergency drains, Deaerator overflow drain to Hotwell etc.
   - Alloy steel as per ASTM A – 217 GR WC 6 for low flashing / cavitations services like HP heaters & LP heaters normal drain control, drain cooler normal level control, gland steam cooler minimum flow etc.
   - 316 SS for condensate service below 300 deg C like condensate normal and emergency make – up controls etc.
2. The control valve trim material shall be
   - 17 – 4 PH SS for severe services listed under item D.1, 2nd point & 3rd point above
   - 316 SS for services listed at D.1, 4th point above and
   - 316 SS with stellite faced guide parts and bushings for remaining applications.
3. However, Supplier may offer valves with body and trim materials better than specified materials and in such cases Supplier shall furnish the comparison of properties including cavitations resistance, hardness, tensile strength, strain energy, corrosion resistance and erosion resistance etc. of the offered material vis – a – vis the specified material for Owner's / Consultant's consideration and approval.

E. End Preparation

Valve body ends shall be either butt welded / socket welded, flanged or screwed as finalized during detailed engineering and as per Owner's / Consultant's approval. The welded ends wherever required shall be butt welded type as per ANSI B 16.25 for control valves of sizes 65 mm and above. For valves sizes 50 mm and below welded ends shall be socket welded as per ANSI B 16.11. Flanged ends wherever required shall be of ANSI pressure – temperature class equal to or greater than that of the control valve body.

F. Valve Actuator

1. The regulating control valves shall be furnished with pneumatic actuators. The supplier shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut off pressure and leakage class requirements. The valve actuators shall be capable of operating at 60 *C continuously.
2. Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance for stem force, at least 0.15 kg / cm^2 per linear millimeter of seating surface, shall be provided in the selection of the actuator to ensure tight seating unless otherwise specified.
3. The travel time of the pneumatic actuators shall not exceed 10 seconds.
4. For quick opening / closing services (such as fuel oil shut – off valve), the actuator shall be pilot solenoid operated pneumatic drive; the rating of solenoid shall be 24 V DC.
5. Selection of actuator shall be such that it meets the requirements of thrust / torque, stroke length, angular movement, full scale travel time, repeatability & accurate positioning for successful operation of final control element.
6. All the actuators shall have also provision for manual operation during emergency / maintenance along with graduated local position indicator.

G. Control Valve Accessory Devices

All control valve accessories such as air locks, hand wheels / hand-jacks, limit switches, SMART positioners, diffusers, external volume chambers, reversible pilot for positioners, tubing and air sets, solenoid valves and junction boxes etc. shall be provided as per the requirements.

Table 9.24(i)

Specification for E-to-P converter

S.N	Feature	Minimum Requirement
1	Air Supply	1.5 Kg/Sq. cm
2	Input Signal	4-20 mA DC
3	Output Signal	0.2 to 1.0 Kg/ Sq. cm
4	Linearity	0.5 % of span or better
5	Hysteresis	0.1 % of span or better
6	Ambient Temperature	<0.2 % of span per Degree centigrade

S.N	Feature	Minimum Requirement
	Effect (-20 to +60 *C)	
7	Mounting	Close to Actuator
8	Protection class	IP-65
9	Enclosure	Die cast Aluminium
10	Drift	+/- 2% of set point per hour

Table 9.24(ii)

Specification for Smart Positioners

S.N	Feature	Minimum Requirement	
1	Input	4-20 mA DC	
2	Power Supply	24 V DC Loop powered	
3	Type of Electronics	Microprocessor based with self diagnostic facility & digital communication by means of HART Protocol	
4	Valve position sensing	Non-Contact type with 4-20 mA DC Output	
5	Enclosure Type/Material	Weather & Dust proof to IP-65/ Die cast Aluminium	
6	Ambient conditions	Suitable for - 30 to +80 *C temperature & 0-95% Humidity	
7	Operating Range	Suitable for Full range & Split Range operation	
8	Modes of operation	Suitable for Direct & reverse valve action	
9	Flow characteristics	Suitable for Linear & Equal percentage Characteristics	
10	Fail safe/Freeze feature	Required	
11	Air Capacity	Sufficient to handle the Valves Selected/Boosters to be supplied if required.	
12	Air supply pressure	To suite the Air Supply Pressure / Quality available	
13	Process Connection	1/4" NPT	
14	Characteristic Deviation	< =0.5% of span	
15	Ambient Temperature effect	< =0.01%/Deg C or better	
16	Configuration	Remote Calibration, Auto & Manual Calibration shall be possible	
17	Cable Entry	½" NPT, Side or Bottom Entry to avoid water ingress	
18	Accessories	a)	Display with push buttons for configuration and Display on the positioner itself (Password Protected / Hardware Lock).
		b)	For Supply & Output Pressure, Filter Regulator and other accessories shall be provided as on required basis for making system complete
		c)	Valves Mounting Assembly For Sliding Stem / Rotary / Single Acting / Double Acting on required basis

1. SMART positioner shall be a Double stage positioner. The first stage of the positioner shall be typically a flapper-nozzle that serves as a high-gain pre-amplifier. This sensitivity shall be maintained over a wide range of dynamic conditions. Second stage shall be a power amplifier that provides power to drive the actuator. Preferably this shall be a pneumatic relay. Spool Driven type SMART positioners are not preferred due to Higher Dead Band and Poor responsiveness. The SMART positioner shall have pressure sensors to measure the pneumatic outputs to the actuator.

2. The control algorithm for the positioner shall use feedback signal from the motion of the pneumatic relay beam instead of pressure feedback to minimize pneumatic related effects and for stable and smooth response of the control valve. The SMART positioner shall have user adjustable tuning sets to identify the optimum tuning for the total valve assembly. SMART Positioner with HART Communication facility shall communicate all the valve diagnostics to Plant DCS.

Table 9.24(iii)

Specification for Air Filter Regulator (AFR)

S.N	Feature	Minimum Requirement
1	Type	Constant Bleed type
2	Inlet Pressure	10 Kg/Sq. cm (maximum)
3	Output	Adjustable from 0-2 Kg/Sq. cm or 0-7 Kg/Sq. cm (Continuous) as required
4	Filter Element	5 microns
5	Filter Element Material	Phosphor Bronze
6	Bowl Material	Metallic
7	Enclosure Protection class/ Material	IP-65/ Die cast Aluminium
8	Process connection	¼ " NPT
9	Accessories	All mounting accessories. 2" dial size Pressure gauge.

Table 9.24(iv)

Specification for Position Transmitter

S.N	Feature	Minimum Requirement
1	Power Supply	24 V DC Loop powered
2	Type	Non-Contact/ LVDT type
3	Output	4-20 mA DC/ Linear
4	Accuracy	+/- 1%
5	Enclosure Protection class/ Material	IP-65/ Die cast Aluminium
6	Cable Entry	½" NPT, Side or Bottom Entry to avoid water ingress.

S.N	Feature	Minimum Requirement
7	Accessories	All mounting accessories

Table 9.24(v)

Specification for Limit Switch (Non Contact Type)

S.N	Feature	Minimum Requirement
1	Type	Non-contact type inductive Proximity
2	Sensing distance	10 mm minimum
3	Hysteresis	Maximum 10% of sensing distance
4	Indicator	LED indication
5	Protection class	IP 67
6	Integral Cable	1 mtr.
7	Power supply	24 V DC/ 8 V DC
8	Mounting	Flush mounting with check nut
9	Other Feature	Explosion proof enclosures shall be provided wherever required by the application. Shock & Vibration proof.

G. Test & Examination

1. All valves shall be tested in accordance with the quality assurance programme agreed between the Owner / consultant and the bidder which shall meet the requirement of IBR and other applicable codes.
2. The tests shall include but not but limited to the following:
   - Non-destructive test as per ANSI B – 16.34.
   - Hydrostatic shell test in accordance with ANSI B16.34 prior to seal leakage test.
   - Valve closure test and seal leakage test in accordance with ANSI B16.34 and as per the leakage class indicated under clause no. B.6.
   - Functional test: The fully assembled valves including actuators control devices and accessories shall be functionally tested to demonstrate times from open to close position.
   - All control valves shall be tested with the positioners for accuracy of positioning and reproducibility over the full range of travel.
   - CV Test : CV test shall be carried out as type test on each size, type and design of the valves as per AISA 75.02 standard and test report shall be furnished for Owner's / consultant's approval.

- Magnetic particle inspection shall be performed on all machined surfaces of valves having ASA rating of 1500 lbs ASA or greater. All carbon steel valves with 1500 lbs ASA or greater shall receive 100% radio graphic examination in accordance with ASTM – E71.

3. Bidder shall submit test certificates for the tests mentioned in above paragraphs in accordance with ASME and ASTM requirements. In addition supplier shall also submit for the above equipment, certificate of manufacture and test as required by the Indian Boiler Regulations. The certificate shall be in the prescribed forms III A & III C and shall be endorsed by an Inspection Authority recognized by the Indian Boiler Regulations.

H. General Requirements

1. Bidder shall furnish all the control valves as finalized during detailed engineering stage without any price repercussions whatsoever depending on the process requirements.
2. Following documents to be furnished by the Supplier after the award of contract.
   a. Final data sheet for all control valves.
   b. Detailed dimensional and cross-sectional drawing of control valves, indicating end to end dimensions, various clearances required, weight etc.
   c. Test certificate for the following :
      - Hydrostatic test for all control valves
      - Magnetic particle inspection for all control valves.
      - Radiographic examination of control valves.
      - Seal tightness test for control valves
      - Materials test certificate for control valves.

9.26 Pneumatic Power Cylinder

Table 9.25

Specification for Pneumatic Power Cylinder

S.N	Feature		Minimum Requirement
1	Applicable standard		ISO 6431
2	Mounting Type		Fixed Position mounting/ Trunion mounting
3	Material	Cylinder	Seamless Steel Tube
		Piston rod	Hard Chrome Plated Steel

f) The work shall include the erection of sub-trays conduits for the cabling between probe head to the analyzer cabinet and the tubings for test gas, from analyzer cabinet to the probe.

g) While installing the analyzer cabinet care shall be taken to locate the same within the specified maximum distance from the probe.

h) All earthing continuity tests, insulation tests etc. shall be done as per manufacturer's recommendation.

13.5 Control Valves & Accessories

Bidder's scope of work shall include erection of control valves along with all related accessories like air filter regulator, valve positioners, limit switches, position transmitters and indicators, solenoid valves, airlock relays, volume chambers etc. Bidder's scope of work shall also include all related interconnecting tubing work for the above accessories and terminating all electrical connections up to local junction box. Any supporting structures, pedestals etc. required to make the installation complete shall be considered part of erection activity. Bidder's scope of work also includes testing and commissioning of all pneumatic control valves.

1. The general conditions laid down for erection of field instruments shall also be valid for control valves (wherever applicable).
2. Slight reorientation of flanges, if necessary, shall be considered a part of erection activity.
3. Control valve should be identified with regard to their tag number, control action, CV value, flow direction etc. as inscribed on the tag plate vis-à-vis the data sheet.
4. The orientation and position of the control valve shall be such that difficulties shall not arise while removing, repairing or servicing the valve after installation.
5. Bidder shall install valves only after ensuring proper flow direction.
6. The preferred position of a control valve is diaphragm up.
7. Air supply line shall be drawn from nearest air header by means of a GI sub-header to the vicinity of the installation. Isolation / needle valve to be provided on air line to each control valve / damper.
8. Tubing work shall generally comprise of tubing between I/P converter to valve positioner / solenoid valve / actuator, air supply to filter regulator from nearest CS sub-header, filter regulator to positioner / actuator.
9. Bidder's scope of cabling pertaining to control valve erection shall include cabling from solenoid valves, limit switches and electronic position transmitter up to local junction box.
10. Bidder shall include gaskets, nuts, bolts, site fabricated clamps and other erection items required to complete the installation.

11. All air piping / tubing shall be blown clean with compressed air at 3.5 Kg/sq. cm and complete lines along with fittings must be tested for leakage with soap bubbles.
12. After installation, the control valves shall be greased at greasing nipples wherever applicable.
13. After completing the installation satisfactorily in all respect, Bidder shall perform the following tests.
    - Linearity of stem movement shall be checked at four points (inputs 25%, 50%, 75%, 100% of spring range) while rising and while falling.
    - Hysteresis shall be checked.
    - Response time shall be noted.
    - Operation of airlock relay shall be checked.
    - Operation of stay put conditions (under electrical signal failure shall be checked).
14. After testing, the valve shall be boxed up with blind gaskets at both ends to prevent entry of foreign materials and clogging of plug and seat.
15. During steam blowing / acid cleaning it may be necessary to remove the valve as a whole or in part breaking a part of top-work and reconnect the spool piece. The removal, reinstallation, dismantling and reconnection of tubing and cabling shall be in Bidder's scope of work.

13.6 Flow Elements

13.6.1 Orifice Plate

For orifice plates with flange taps Bidder's scope shall include fixing of nipple and first take-off valve, fixing and supporting condensation pot (wherever applicable) and insertion of orifice plate with suitable gaskets, nuts and bolts. For orifice plates with D, D/2 tapping, pipe welded stubs shall be available.

The general guidelines for installation of orifice plates are given below.

1. The length of the take-off nipples shall be sufficient so that the first take-off valve protrudes beyond the thermal insulation.
2. The take-off nipples shall be screwed / welded according to the design requirement.
3. The hand wheel of the take-off valves shall be so oriented that they can be operated conveniently from approach platform, ladder etc. Otherwise approach platform, ladder shall be provided.
4. For steam services, condensation pots shall be connected to the tapping point before or after first take-off valves. Utmost care shall be taken to ensure

S.N	Instruments/Equipments	Test to be conducted
21	Control valves	• IBR certificate Form III C • Hydrostatic test : IBR/MSS-SP-61/ANSI B 16.34 • Seat leakage test : As per ANSI B 16-104 • CV test : As per ISA procedure • Magnetic particle test : As per ANSI B 16.34 Special class (applicable for pr.> 70 bar & tem < 4000C • Liquid penetration test : As per ANSI B 16.34 Special class (applicable for pr > 70 bar & temp < 4000C • Calibration • Hysteresis test
22	Position Transmitters	• Calibration • Hysteresis • Accuracy test
23	I/P Converters	• Calibration test • Accuracy Test
24	Solenoid Valves	• Hydro test • Seat leakage test • CV test • Coil insulation test
25	Air Filter Regulators	• Calibration test • Accuracy test
26	Junction Boxes	• Test for degree of protection • Material test
27	Transmitter Racks/ Enclosures/Local Panels/Marshalling Cabinets/System Cabinet	• Hydro test • Air leak test for tubing, Piping & fittings Verification of degree of protection • Test for enclosure type • Type tests & routine tests as per relevant Indian standards. • Electrical tests as detailed under "Wiring, Terminations & Accessories"
28	Wiring Termination and Accessories	
a	Routine test	• Conductor resistance test (*) • High voltage test (*) • Impulse dielectric test • Insulation test • Humidity test • Temperature rise tests on power circuits • Short time current tests on power circuits.
b	Type test	• Annealing test (*) • Test for insulation and sheath (*) • Flame retardance test – (a) Oxygen index, (b) Flammability • Test for acid gas generation • Test for water absorption (*) • Wet dielectric test.
		Note (*) – As per IS-1554
29	Test for terminal blocks	• Test for moulding for flame resistant

Table 14.2

Type Test Requirement

S. N	Item	Test Requirement	Standard	Test To Be Specifically Conducted	Approval Req. on Test Certificate	Remarks
1	Transducers	As per standard	IEC-688, IS12784	No	Yes	
2	Thermocouple	Degree of protection test	IS-1247	No	No	
3	RTD	As per standard	IEC-751	No	No	
4	Electronic transmitter	As per standard	BS-6447 / IEC-770	No	Yes	
5	E/P converter	As per standard	Mfr. Standard	No	No	
6	Pressure gauge	Degree of Protection test Temp interference test	IS-2147 IS-3624	No No	No No	
7	Temperature gauge	Degree of protection test	IS-2147	No	No	
8	Pressure & DP switch	Degree of Protection test As per standard	IS-2147 BS 6134	No No	No No	
9	Level switch	Degree of protection test	IS-2147	No	No	
10	Conductivity level switch	Degree of protection test	IS-2147	No	No	
11	Control valves	CV Test	ISA 75.02	Yes	No	
12	Flow Nozzles & Orifice plate	Calibration	ASME PTC , BS1042	Yes	No	
13	SG control System a)I/O modules b) Other modules c)CLCS Systems	SIL-3 CMRR & NMRR verification CMRR & NMRR Verification Model test	As per standard Mfr standard Mfr standard Approved procedure	Yes Yes Yes Yes	Yes Yes Yes Yes	
14	LIE / LIR / Junction Box	Degree of protection test	IS-2147	No	No	
15	Flue gas O2 Analyser	Degree of protection test	IS-2147	No	Yes	
16	Flue gas CO Analyser	Degree of protection test	IS-2147	No	Yes	