

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO	REV 00
	TITLE : SPECIFICATION OF NITROGEN BANK FOR BFV	241594856-C	Page 1 of 6

PROJECT: PUNATSANGCHHU-II (6 X 170 MW) V. FRANCIS

1. GENERAL:

Nitrogen bottle bank will be used as pressurized gas chamber for piston accumulator to provide cushioning for pressurized oil supply to hydraulic servo motor. This specification covers design, engineering, performance testing and supply of nos. of pre-charged nitrogen cylinder quad as per drg.no. 32200618802 Rev.00.

2. SCOPE OF SUPPLY:

**2.1 NITROGEN BOTTLE BANK (Device No.252PV) - 3 Sets of Cascaded Bank
(DEVICE NOS. 240PVB-1~36, 240PV-1~3, 240PVA-1~3, 241PV-1~3, 243PVA-1~3)
{Refer Schematic drawing no. 32200618802 Rev.00}**

Each cascade consists of 36 nos. of nitrogen cylinders each of 50 Liters Capacity pre charged at 100 kg/cm², Isolating valves & Pressure Gauge. All cylinders are to be painted as per gas cylinder Rule 1981 and assembled into a free standing steel welded frame/stand. Quad frame shall have provision for lifting by crane from the top of frame and by fork lift from bottom of frame, with full weight of cylinders filled with gas. The quad and top frame to be reinforced to prevent any twisting or stress to cylinder connection during lifting by crane or by fork lift. All cylinders shall be mounted horizontally inside the frame.

- **Each N₂ bottle must have N₂ inlet / outlet connection of full bore 3/4" BSP (F).**
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- Each cylinder must have Pressure isolating ball valve (Device No. 240PVB) of 3/4" BSP & connected to header of 12 cylinders as per schematic drawing. It must be of ball valve type of class 900 with SS ball.
- All pipes must be S.S. seamless & fitting must be S.S. (Weldable type) suitable for schedule 160. All valves must be class 900.
- All inter connection tubes between cylinders and common header will be of 20 NB. Common header should be of 32 NB as shown in the drawing.
- Each common header shall be provided with Φ 150 / 160 mm dial pressure gauge having internal dampening / glycerin with isolating needle valve range 0 – 250 kg/cm² assembled as per schematic drawing. The pressure gauge should be mounted at suitable place on the mounting stand and shall be connected with needle valve through mininess hose and coupler.
- Common headers of N₂ Bottle quad to be provided with 1-1/4" BSP isolating ball valves (Device no. 240PV-1~3 & 240PVA-1~3) type of class 900 with SS ball as per schematic drawing.

REV.NO.		DISTRIBUTION.	QTY.	APPROVED:			
PREPARED				PKB			
CHECKED		HPE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED		MM(H)	04				10.10.19
DATE				VKN	AP	AP	



- Each common header of 12 cylinders must be interconnected with 1-1/4" BSP isolating ball valves (Device no. 240PVA-4~5) type of class 900 with SS ball as per schematic drawing.
- The cylinders and valves are rated for full range of temperature and pressure and data are stamped on the cylinder as well as on the valve body to indicate the service rating i.e. 120 kg/cm².
- Lifting lugs (minimum 4 nos.) to be provided with factor of safety 4. Anchor fastener for foundation to be of property class 12.9.
- Vendors shall supply the Nitrogen Bottle Bank in completely filled condition. Alternately, vendor also has the option to supply empty bottles to site and arrange for Nitrogen filling at site. However, all the arrangements of transportation of Nitrogen to site, filling of Nitrogen etc would have to be done by the vendor. All the cost involved in filling of Nitrogen Cylinders at site would have to be borne by the vendor.
- The final end process connections (N1~N3 and NA1 ~ NA3) on the N2 cylinder bank should be as specified in the schematic drawing.

2.1a) TECHNICAL PARAMETERS (FOR CYLINDERS)

- | | |
|---------------------------------|--|
| 1. Design code compliance | - IS: 7285-1988 |
| 2. Cylinder water capacity | - 50 liters +5%-0 |
| 3. Design pressure | - 120 kg/cm ² |
| 4. Normal operating pressure | - 100 kg/cm ² at 25°C |
| 5. Cylinder pre-charge pressure | - 100 kg/cm ² |
| 6. Hydraulic test pressure | - 180 kg/cm ² |
| 7. Pressure Gauge | - Dial Φ150 / Φ160 mm, Range 0 – 250 kg/cm ²
Accuracy ± 2.5% FSD |

2.2 CHARGING KIT AND H.P.NITROGEN CHARGING CYLINDER BANK:

- One no. charging kit of BFV OPU system for complete valve house to be supplied separately & must be suitable for connecting N2 bottle charging bank & piston accumulator charging block. The hose length of the charging kit should be minimum 4 meter in length. Suitable adapters should be supplied for connecting the charging kit with charging block of piston accumulator & N2 bottle charging bank.
- One no. H.P.charging cylinder bank for complete power house, 5 Nos. High pressure nitrogen gas filled charging cylinders having capacity 50 liters each and connected to the common header, charged at 200 kg/cm² to be provided. This arrangement shall be portable type so that the same can be maneuvered within the powerhouse. Each Cylinder must have suitable gas regulating valve as per gas standard and should be connected to common header as shown in drawing no. 32200618802 Rev.00. Common header should have ball valves (1-1/4" BSP) of class 900 with SS ball at both ends.

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- The common header shall be provided with Φ 150 / 160 mm dial pressure gauge having internal dampening / glycerin with isolating needle valve range 0 – 250 kg/cm² assembled as per drawing 32200618802 Rev.00. The pressure gauge should be mounted at suitable place on the bank and shall be connected with needle valve through minimesse hose and coupler.

2.2a) TECHNICAL PARAMETERS (FOR CHARGING CYLINDER & KIT):

- | | |
|---|----------------------------------|
| 1. Design & construction code compliance | - IS: 7285-1988 |
| 2. Cylinder water capacity | - 50 Litres +5%-0 |
| 3. Charging cylinders | - With gas regulating valve |
| 4. Design pressure | - 220 kg/cm ² at 250C |
| 5. Working pressure/charging pressure | - 200 kg/cm ² |
| 6. Hydraulic test pressure | - 300 kg/cm ² |
| 7. Range of Pressure Gauge of bank | - 0-250Kg/cm ² |
| 8. Range of Pressure Gauge in regulator kit | - 0-250Kg/cm ² |
| 9. Pressure gauge accuracy class | - Accuracy $\pm$ 2.5% FSD |

3. DOCUMENTATION:

3.1 The supplier shall submit the following documents at the time of offer, which shall include the following.

- Bill of material along with model code, make, quantity & catalogue, incomplete offer is not acceptable.
- Catalogues for the items mentioned in this specification to be submitted by supplier separately along with the offer.
- Guaranteed technical particulars.
- List of Deviations: Supplier to submit list of deviations, if any, from our spec. otherwise it will be understood that the supplier is meeting all the requirements mentioned in our spec.
- Vendor has to submit the credentials containing the following documents.
 - Organizational infrastructure
 - Manufacturing and testing facilities
 - Ranges of products offered
 - List of past supplies
 - Performance certificates from end users and completion certificates
 - Availability of after sales services in India
- Documents listed above in sl. no. 'v' of documentation are required by our customer (PHPA-II). During technical scrutiny, if any other documents are required by our customer then same to be submitted by the vendor. Failure to submit the same may lead to rejection of the offer. Price bid shall be opened only of those vendors who shall be approved by our customer.

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3.2) After award of Contract:

The supplier shall submit the documents / drawings within 8 weeks after award of PO, which shall include the following.

- Outline general arrangement of N2 bottles quad drawings showing all the devices, overall dimensions, layout, and foundation details etc.
- Individual N2 cylinder drawing showing view dimensions, connections, technical particulars etc.
- Total weight of assembly to be furnished by the vendor in the drawing.

After incorporating our comments subsequent revised drawing shall also to be submitted within 2 weeks of receipt of comments.

- 10 copies of Operation and maintenance manual covering catalogue and Drawings are to be supplied within one month of dispatch. In addition, to this soft copy of the O & M manual to be submitted.
- 3 copies of test certificate of N2 cylinder quad & individual cylinder certificate from Boiler Inspector Nagpur.
- Calibration certificate of Pressure gauge.
- Material TC, Guarantee certificate and compliance certificate of all bought out items used in the assembly along with dispatch of equipment.
- BHEL / BHEL Customer (PHPA-II) / BHEL appointed TPIA shall witness the DPT of weld joints of pipes and pressure test of N2 bottle bank.
In addition to this soft copy of the test certificates to be submitted.

4. INSCRIPTION PLATE:

The items are to be identified by metallic Inscription plate bearing device no. mentioned in schematic drawing No. 32200618802 REV.00 BHEL monogram with rating plate should be suitably mounted on Assy.

5. GURANTEE / WARRANTEE CERTIFICATE:

The guarantee / warrantee should be for 18 months from the date of dispatch.

6. PACKING:

N2 Bottle bank to be supplied with Nitrogen filled in pressurized condition. Packing of the N2 Bottle bank should meet the safety norms for transportation. Packing should be such that the equipment is capable of withstanding the transit conditions without damages.

Packing list and list of boxes shall be furnished by the supplier along with dispatch.



NOTE: 1. SUPPLIER SHOULD CLEARLY INFORM THE TYPE OF STORAGE REQUIRED (i.e. OPEN STORAGE OR COVERED STORAGE) TO ENABLE US TO ADVISE OUR CUSTOMER. THIS INSTRUCTION SHOULD ALSO APPEAR IN O & M INSTRUCTION MANUAL ALONG WITH TROUBLE SHOOTING & SOLUTION.

7. SPARES FOR N2 BOTTLE BANK:

Qty. – 1 set (Consisting of the following items):

SL NO.	ITEM DESCRIPTION	QUANTITY
1.	Pressure Gauge (Device no. 241PV)	3 Nos.
2.	Isolating valve (device no 240PV-1)	2 Nos.
3.	Isolating Valve device no 240PVB-1) of main cylinder	2 Nos.
4.	Isolating valve (device no. 323PVa) of pressure gauge	2 Nos.
5.	Complete set of all seals & packing 1 Set = 2 Nos. of each type	2 Set

**Annexure -I****LIST OF INSTRUMENTS & DEVICES ASSEMBLED ON N2 BOTTLE BANK**

S.No.	Device No.	Description	Specification	Quantity	Make
1	240PVB-01 to 36	Isolating valve	Ball valve type	36 Nos.	Hydac /Yuken / Rexroth / L&T / Audco / MHA Zentgraf
	240PVA-1~5			5 Nos.	
	240PV-1~3			3 Nos.	
2	323PVa-1~3	Isolating valve	Needle type	3 Nos.	
3	241PV-1~3	Pressure Gauge	Refer clause no. 2.1a	3 Nos.	Ashcroft / Wika / Budenberg / Kobold
4	--	Anchor Fastener with bolt & nut	Refer clause no. 2.1	1 Set	Hilti

LIST OF INSTRUMENTS & DEVICES ASSEMBLED ON N2 CHARGING BANK:

Sr. No.	Device No.	Description	Specification	Quantity	Make
1	240PVC-01 to 05	Isolating valve	Standard gas regulating valve	05 Nos.	As per Cylinder Manuf. standard
	240PVD		Ball valve type	1 No.	Hydac /Yuken / Rexroth / L&T / Audco / MHA Zentgraf
	240PVD-1			1 No.	
2	323PVd	Isolating valve	Needle valve	1 No.	Hydac /Yuken / Rexroth / L&T / Audco / MHA Zentgraf
3	241PVd-1	Pressure gauge	Refer clause no. 2.2	1 No.	Ashcroft / Wika / Budenberg / Kobold

Note:

- 1. Vendor has to use all the above instruments and devices from their manufacturing range only, if they are suiting to our technical specification.**
- 2. All the above makes of the instruments and devices shall require end customer approval.**