

**HYDRO PROJECTS ENGINEERING DIVISION**

SPECIFICATION NO.

REV 00

**TITLE : SPECIFICATION OF NITROGEN BOTTLE
BANK FOR GOVERNOR & MIV****241595758**

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PROJECT : VISHNUGAD PIPALKOTI HEP (4 x 111 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 piping . 32200219703 Rev. 00.

2. SCOPE OF SUPPLY:**2.1 NITROGEN BOTTLE BANK (Qty. Required: 4 Sets Cascade Bank)
(DEVICE NOS. 252, 240-1~4, 240A-1~3, 241-1~4 & 244-1~88)**

Each cascade consists of 88 nos. of nitrogen cylinders each of 50 Liters Capacity pre charged at 100 Kg/Cm², isolating valves, pressure gauge and safety valve. All cylinders are to be painted as per Gas Cylinder Rule (IS:4379-1981) 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 with suitable clamping arrangement.

- Overall dimension of quad must be within **4100 mm (L) x 2050 mm (W) x 3650 mm (H)** approx.
- Each N2 bottle must have N2 inlet / outlet connection of full bore ¾" BSP (F).
- Each cylinder must have Pressure isolating valve (Device No. 244) of 3/4" BSP & connected to common header of sizes as per drawing no. 32200219703 Rev.00. It must be of ball valve type of class 900 with SS ball.
- All pipes must be of Seamless Carbon Steel (C.S.) & fitting must be of C.S. (Weldable type) suitable for Schedule 80. All valves must be of class 900. Pipe assembly to be pressure tested at 180 Kg/Cm² for 30 minutes after isolating Nitrogen Bottles from the system.

REV.NO.		DISTRIBUTION.	QTY.	APPROVED:			
PREPARED				(PKB)			
CHECKED		HPE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED		MHX	04				04.05.2019
DATE				(DB)	(MS)	(MS)	

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- Each quad shall be provided with $\varnothing$ 150 / 160 mm dial pressure gauge having internal dampening / glycerin with isolating valve range 0–250 Kg/Cm² assembled in each common header pipe. (Total qty. of pressure gauge will be 8 nos.).
- Inlet / outlet of common header N₂ Bottle quad to be provided with 1-1/4" BSP **Isolating Ball Valve (Device no. 240)** type of class 900 with SS ball.
Make (Device no. 240 & 244) : Hydac/Hydair/Audco/Fouress/Leader
- 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 design pressure 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.
- Painting shall be finalized on the later stage and same shall be communicated to successful bidder after placement of P.O.

2.1 (a) TECHNICAL PARAMETERS

- | | |
|---------------------------------|--|
| 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 $\varnothing$ 150 / $\varnothing$ 160 mm, Range 0 – 250 Kg/Cm ²
Accuracy $\pm$ 2.5% FSD |

8. Pressure gauge Make - M/s Ashcroft / Wika / Warea/Forbes Marshal/ Budenberg/Kobold

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

- One set charging kit to be supplied for the system (Governor & MIV) and must be suitable to N2 bottle bank inlet connection & piston accumulator charging block. The process connection at charging block of piston accumulator shall be informed later on.
- HP charging cylinder bank having 5 Nos. High pressure nitrogen gas filled charged cylinders of capacity 50 liters each, pre-charged at **200 Kg/Cm²** to be provided. This arrangement should be portable type so that the same can be maneuvered within the power house. **Each cylinder**



should have inlet outlet connection with suitable fittings and isolating valve to suit to block mounted on piston accumulator stand.

2.2 (a) TECHNICAL PARAMETERS:

- | | |
|--|----------------------------------|
| 1. Design & construction code compliance | - IS: 7285-1988 |
| 2. Cylinder water capacity | - 50 Liters (+5%, -0%) |
| 3. Design pressure | - 220 Kg/Cm ² at 25°C |
| 4. Working pressure/charging pressure | - 200 Kg/Cm ² |
| 5. Hydraulic test pressure | - 300 Kg/Cm ² |
| 6. Range of Pressure Gauge in regulator | - 0-250 Kg/Cm ² |

3. DOCUMENTATION:

3.1 The supplier shall submit the documents / drawings within four (04) 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

3.2 10 copies of O & M manual covering catalogues & drawings are to be supplied along with the dispatch of equipment.

- 3 copies of test certificate of N₂ cylinder quad & individual cylinder certificate from Boiler Inspector Nagpur.
- **Calibration certificate & compliance certificate of Pressure gauge**
- **Material TC, Guarantee certificate of all bought out items used in the assembly along with dispatch of equipment.**

4. INSCRIPTION PLATE:

The items are to be identified by metallic Inscription plate bearing diagram of control gear no. marked thus mentioned in DCG drawing No. **32200219703 Rev.00**. BHEL monogram with rating plate suitably mounted on assembly.

5. GURANTEE CERTIFICATE:

The guarantee should be for 12 months from the date of commissioning of equipment or 18 months from the date of dispatch.



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6. PACKING:

N2 Bottle bank to be supplied with Nitrogen filled in pressurized condition. Packing of the N2 Bottle bank should meet the safety norm 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: 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. LIST OF SPARES :

(Annexure-A)

- | | | | |
|------|---|---|--------|
| i. | Seals of all types of coupling (1 Set = 1 No. of each type) | - | 2 Sets |
| ii. | Isolating valve (1-1/4" BSP) (Device No. 240) | - | 2 Nos. |
| iii. | Isolating Valve (3/4" BSP) (Device No. 244) | - | 2 Nos. |

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