PSGSG/22-23/004		**Specifications for Supply of cylinders and blending of gases with different composition**	No.	PSGSG/22-23/004
			Date:	09.07.22
			Product:	General
			Sheet:	1/2

1.0 1.1 General Description:

This specification governs the technical requirements of gaseous mixture of Novec4710 fluid, CO2 and O2.

2.0 2.1 APPLICATION :

For Gas Insulated Power Equipment.

3.0 3.1 Quantity :

S. No. . .	Item/Service . .	Quantity (Cylinders)	Expected net weight of the gaseous mixture in each cylinder (+/-10%)
1	Blending of NOVEC4710-5%+O2-5%+CO2-90%	1 No.	4.5-5.0 kg (Approx.)
2	Blending of NOVEC4710-7.5%+O2-5%+CO2-87.5%	2 Nos	3.0-3.5 kg (Approx.)
3	Blending of NOVEC4710-10%+O2-5%+CO2-85%	2 Nos	2.5-3.0 kg (Approx.)
4	Supply of 47 ltr carbon steel cylinders with brass valve	5 Nos	NA

4.0 TECHNICAL :

4.1 **Gas Cylinders & Valves:** Gas mixture shall be supplied with NEW cylinders and valves manufactured.

4.2 **Cylinder Capacity:** Preferred water capacity of the cylinders supplied shall be around 47 liters.

4.3 **Design & Test Pressures:**

1.0: The cylinders shall have a minimum designed working pressure of around 130 kgf/cm2 (gauge) or above.

2.0 : The test pressure for hydraulic stretch test shall be at least 210 kgf/cm2 (gauge).

<table>
<tr><td>5.0</td><td>5.1</td><td>Scope of Work:
1. The supply of Novec4710 Gas Cylinder of 11.2 kg will be in the scope of BHEL R&D and Insurance cost is borne by BHEL.
2. The required CO2 and O2 will be supplied by the supplier.
3. The Gas mixture shall be supplied in standard 47L Carbon Steel seamless cylinder with brass valve and the supply of cylinder is in the scope of suppliers on Out Right Supply basis only.
4. Different composition of mixing shall be supplied in different cylinders and each cylinder shall be clearly indicate the composition of gas (CO2, O2 and Novec-4710) and Net weight.
5. The supplied gaseous mixture shall be in gaseous form at room temperature.
6. The partially filled cylinder of Novec4710 shall be returned to BHEL R&D-Hyderabad along with mixed green gas cylinders.
7. Transportation of Novec4710 from Corp. R&D to supplier workplace and from supplier workplace to Corp R&D shall be in scope of BHEL Corp R&D.</td></tr>
<tr><td>6.0</td><td>6.1

6.2
6.3

6.4</td><td>COMPOISTION OF THE MIXTURE:
The mixture shall be prepared after the mixing of Novec4710 fluid, CO2 and O2 gas in molar ratio as :
<table>
<tr><td>S. No.</td><td>Novec4710</td><td>CO2</td><td>O2</td><td>Moisture</td></tr>
<tr><td>1</td><td>5.0</td><td>90.0</td><td>5.0</td><td>2.0-5.0ppm(m/m)</td></tr>
<tr><td>2</td><td>7.5</td><td>87.5</td><td>5.0</td><td>2.0-5.0ppm(m/m)</td></tr>
<tr><td>3</td><td>10.0</td><td>85.0</td><td>5.0</td><td>2.0-5.0ppm(m/m)</td></tr>
</table>
The moisture content limit shall be strictly followed.
The tolerance in the molar ratio of Novec4710 <0.1% (mole), CO2<2.0% and O2<5.0%.
The supplier shall share the weight of individual components and gaseous mixture with BHEL before mixing and after confirmation by BHEL the mixing process shall be started.</td></tr>
<tr><td>7.0</td><td>7.1

7.3</td><td>COMPLIANCE WITH STANDARDS :
Cylinder Valves: The valves fitted to the cylinders shall conform to ANSI: B57.1 or BS: 341 Part I or IS: 3224.
The supplied CO2 shall be of Grade 5.0 and shall have the purity of 99.999 %.
The supplied O2 shall be of Grade 5.0 and shall have the purity of 99.999 %.</td></tr>
<tr><td>8.0</td><td>8.1</td><td>DOCUMENTS TO BE SUBMITTED BEFORE SHIPMENT :
1. Chemical Composition Report of each gaseous mixture.
2. Pressure and wt. of the gas in each cylinder.
3. Specification report of mixed CO2 and O2.
4. Specification to which the cylinders are manufactured and the name and address of the manufacturer and Inspecting Agency.
5. Record of the Hydraulic stretch test conducted in respect of each cylinder.
6. Specifications to which the valves are manufactured.
7. Inspection agency’s certificate pertaining to the valves giving results of chemical analysis, Physical tests of the material used for the valves etc.
8. Filler’s certificate indicating filling ratio at which each cylinder has been filled.</td></tr>
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9.0		**MARKING :**		
	9.1	Identification Marking: Each cylinder shall be durably and legibly marked by stamping, engraving or similar process with the following, preferably at the valve end and off the cylindrical part.		
	9.2	Other Markings: Each cylinder shall be marked by stamping, engraving or similar process with the following details: a) Manufacturer's mark. b) Inspection agency's mark c) Rotation No. (Serial No.) Other specification details as prescribed in the relevant standard.		
PSGSG/22-23/004			Signature:	
			Date:	