TECHNICAL SPECIFICATIONS FOR MOBILE NITROGEN GENERATOR WITH MEMBRANE TECHNOLOGY

Sl.No	REQUIRED TECHNICAL FEATURES/SPECIFICATIONS/SCOPE & DESIGN
A	**NITROGEN GENERATOR SYSTEM (purpose, use & location)**
1.	One Electrical Nitrogen Generator 800 SCFM @ 97% N2 Purity suitable for dealing mine fires and also for pro-active inertisation of mines. They should be weather-proof, & transportable. They should be continuous rated and deliver designed quantity and purity at all times. They are required to pump nitrogen over a distance of 10-12 kilometers through pipe line. The suitable diameter of the pipe lines should be specified.
B	**PORTABLE AIR SUPPLY**
1.	Number of Air Compressors/Drive : 2 numbers/Electric Drive
2.	Features: Air cooled design with after cooler, outdoor weather protection and modulation control
3.	Compressor capacity (FAD: Free Air Delivery) in ambient standard conditions of 1 bar and 20ºC as per ISO 1217 to be specified
4.	Compressor Capacity (ACFM: Actual CFM) @30 ℃/ 50% RH at sea level should be specified. It should be sufficient to produce 800 SCFM of N2 at 97% purity after considering the losses in filters, mist eliminators and driers.
5.	Operating Pressure: 10 to 12 bar outlet (approx).
6.	Design Pressure: 15 Bar (approx).
7.	Normal outlet Temperature: Between 5 to 20°C. (The ambient temperature normally varies from 30 to 50 °C in summer months and in winter 10 to 30 ℃)
8.	Design Temperature (min/max) : 5 to 50 ℃
9.	Weight of the compressor should be specified
10.	Dimensions of the compressor should be specified
11.	All required safety features, automatic controls, accessories etc required for safe, efficient and continuous running of the compressor should be provided.
C.	**MIST ELIMINATOR between compressor outlet and Drier**
1.	Mist eliminator is required to be provided to eliminate oil and water aerosols from the compressed air before it flows through the Drier, air system, valves and nitrogen membrane
2.	Numbers required, size, weight and required capacity to suit the compressor air flow to be furnished
3.	Design Pressure to be specified by the supplier
4.	Safety Pressure Relief Valve is required to be provided
5.	Pressure Drop at the mist eliminator to be furnished.
6.	Automatic Drain Trap is required to be provided
7.	ASME Design coded stamped. Maximum Allowable working Pressure must be specified. Must be ASME Section Vlll, Division l or equivalent standards approved in India.
D.	**FILTERS Before & After the Dryer: Two- Stage Filtration**
1.	Type: Coalescing Type suitable to remove oil, and vapour before reaching dryer. (.01 micron @ 99.995% efficiency)
2.	Particulate Removal after the dryer. (.01 micron @ 99.97% efficiency)
3.	Material to be specified.
4.	Pressure Drop (Clean/Dirty) to be specified.
5.	Code: ASME Section VIII, Div l or equivalent standards approved in India.
6.	Automatic Drain Trap if required should be provided.

E.	**Heatless Desiccant Drier/Twin Tower for -40 Deg C Dew Point Filtration**
1.	One Heatless Desiccant Drier Twin Tower is required to effectively dry compressed air to extremely low moisture levels and for achieving Class 2 filtration as per DIN ISO 8573-1 norms.
2.	Design capacity, quantity of activated carbon in each tower and number of units required is required to be specified.
3.	Dryer Dew Point @ 6 to 7 bar: -40 ℃
4.	Maximum Particle Size: < 1 µm
5.	Maximum Oil (Including Vapour): 0.1mg m3
6.	Drier Purge Loss to be specified
7.	Design Pressure is to be specified.
8.	Safety Pressure Relief Valve is required to be provided
9.	ASME Section Vlll Division l or equivalent standards approved in India.
F	**QUANTITY & QUALITY OF AIR SUPPLY AT INLET OF NITROGEN GENERATOR**
1.	Inlet Air supply required (excluding dryer purge loss and Dirty Dirty/Clean Pressure Drop on feed air filtration, dryer Carbon Absorber/final filter package) to get the desired output of 800 CFM of N2 at 97% purity is to be furnished.
2.	The compressed air before allowing it pass through the Nitrogen Modules should be filtered to quality Class 2 as per DIN ISO 8573-1 norms as given below
	o Maximum Oil (Including Vapour):< 0.1mg/^{3}
	o Feed Air max residential dust content Particle Size: <1µm
	o Feed Air max residential dust content Particle Density:<1 mg/m^3
	o Max residual water content :<0.117
	o Max residual water content pressure dew point : -40ºC
G.	NITROGEN GENERATOR
1.	Manufacturer/Model to be mentioned
2.	Type: Membrane Technology, membrane modules in parallel with individual isolation and vibration dampening
3.	Flow control valve, product flow control valve, High O2 alarm shut-off valve, N2 flow meter with local read out and 4-20 output signal and final outlet filter with manual drain should be provided.
4.	Performance of the membrane@ 30 ℃, 50% RH, at sea level should be specified and supported by technical brochures.
5.	Capacity Outlet @ 30 ℃, 50% RH, at sea level. : 800 CFM at 95% purity
6.	Manufacturer should specify the N2 output that can be achieved in case we need 98% & 99% purity.
7.	Operation : Automatic
8.	Inlet/Operating Pressure: 8 to 10 bar. & N2 Pressure@ outlet : 7 to 8 bar
9.	System delta P from pressure Inlet to N2 outlet to be furnished.
10.	N2 Performance based on ambient temperatures @ 30°, 35 °, 40°, 45 °and 50°C to be furnished.
11.	Pressure Safety Relief Valve to be provided.
12.	Moisture indicator with Dryer Dew Point Indicator & Alarm to be provided.
13.	Design Coded stamped for all pressure vessels to be ASME Section Vlll Division 1 or equivalent approved in India.
14.	Design Code should indicate MAWP
15.	Material of Construction to be specified by supplier
16.	Membrane Life time should be minimum 15 years

17.	Oxygen Analyser with /Alarm-Hi O2 Shutdown to be provided. Semi- automatic calibration system should be provided. Data logger for minimum 3 days, 1 minute interval with permanent data transfer to a computer should be provided
18.	It should be possible to operate the unit at lower flow rates if required by bye-passing some membrane modules for which required provision should be available.
H.	**STRUCTURAL SKID PACKAGES**
1.	All the equipments and components where required should be mounted on skid packages. No. of modular skids to be specified**.** Dimensions and weight to be provided for the equipments and the skids
2.	N2 generator should be packaged in 20 ft sea container with lights, panel's, container ventilation fans and interconnecting piping and wiring including a common feed air inlet connection and N2 outlet connection.
3.	Supplier should provide a diagram/Drawing of the skids indicating the number of skids required and length and weight along with drawings and dimensions of the equipments installed. All the required skids and the sea containers should be provided
4.	Lifting tackles of required design and sufficient strength should be provided on the top of the skids/sea containers so that they can be easily lifted whenever required for transport on trailers.
5.	Earthing Bosses: panel grounding to be provided
6.	Piping and instrumentation diagram to be provided
7.	Full Weight to be specified
I	**ELECTRICAL & INSTRUMENTATION**
1.	Electrical Area Classification – Non Hazardous: NEMA 4 outdoor or equivalent standards approved in India.
2.	Available Power: 440 VAC 3 phase
3.	Suitable Control Panel is required to be provided with PLC, condition lights, operating alarms, common trouble alarm contact and specified by the supplier
4.	Junction Box Enclosure Minimum: NEMA 4X – IP 55 or equivalent approved in India
5.	Control Panel Enclosure Minimum: NEMA 4X – IP 55 or equivalent approved in India
6.	PLC is required to be provided with the following controls
	• Automatic Start/Stop
	• Nitrogen Generator Logic Sequence
	• Indications for Start/Stop & Fault
	• Local Gauge Board w/pressure, temperature
7.	Instrumentation Tubing with/fittings (stainless steel) are required to be provided
8.	Stand by mode should be provided
9.	Required Cables, Terminals, conduits to be provided
10.	Attaching Hardware, required gauges, Transmitters & Hour-meter to be provided
11.	Fail Safe rapid- pressurization option to be provided.
12.	Remote monitoring capability to be provided to monitor and control the outlet parameters like flow, purity etc. Method / output type to be specified.
13.	The total power consumption per hour for the complete unit consisting of air compressor, nitrogen modules, filters and accessories etc should be compulsorily furnished
J.	**INSPECTION & TESTING**
1.	Hydro-test record and U1A documentation for Carbon Absorber/Desiccant Drier to be provided.
2.	NDE (RT, UT, MPI) of piping as per ASME B31.3 or equivalent approved in India
3.	NDE (RT,UT,MPI) of Vessels as per ASME Section, VIII, Div.I or equivalent approved in India

4.	Function Test & Performance of Complete Package is required. * Witness by customer or a 3rd party may be required at manufacturer facility or at site as decided by SCCL at its cost.
5.	Performance assessment test at site should be provided for a period of 3 months should be provided.
6.	Final Inspection certificate to be provided
7.	All the statutory provisions and laws that may likely attract in India should be complied.
K	**EXPERIENCE**
1.	Experience of installations of similar capacity of minimum 750 CFM with similar membrane technology to coal mining industry is to be provided. The Bidder should have supplied such a system and should provide list of customers and order copy on the name of the bidder along with performance reports.
L	**MISCELLANEOUS**
1.	Noise Level<80 dBA @ 1 mtr distance
2.	Acoustic Enclosure to be provided if required
3.	Mfg. Protective coating procedure must be submitted.
4.	All the required safety features, filters and other accessories that are required for safe continuous operation and long life should be provided.
5.	Maintenance Requirements is required to be furnished.
6.	The complete unit should be rated for continuous operation.
M.	**Commissioning , spare parts & tools**
1.	Commissioning and installation is required to be done by the supplier
2.	Training should be given at SCCL site for required period in operation and maintenance schedules / milestone should be outlined for normal maintenance intervals.
3.	Special Tools if any required are required to be provided
4.	Three copies of Manuals & operating instructions are required to be provided along with one soft copy. Animated CDs of Assembly, dismantling and maintenance procedures should be provided.
5.	Required Spares & Consumables except oil and lubes for 8,000 hours of operation should be provided. The spares required for 2 years after warrantee shall be quoted and cost of these spares will be added to cost of the equipment to decide the commercial status. Any spares required during actual use which is over and above these spares are to be provided free of cost.
6.	Insurance spares should be provided and the same will be considered for technical evaluation. SCCL will buy the insurance spares after the warranty period of 2 years.
7.	List of all the spares and components along with prices are to be furnished for information.
8.	Spares should be ensured for a minimum of 10 years.
9.	The supplier should establish service and repair facility within India. Any breakdowns should be attended within 48 hours of reporting.
N.	**GUARANTEE/WARRANTEE**
1.	All the parts and components should be guaranteed for minimum 2 years from the date of commissioning.
2.	15 years minimum guarantee for the nitrogen membrane modules. Guarantee certificate should be submitted by the manufacturer of the membrane modules. Any damage to the membranes within the warranty period should be replaced free of cost.
3.	8,000 operating hours for the air- compressor.
4.	2 years warranty for the oxygen sensor.

O.	CONFIRMATION OF COMPLIANCE
1.	Certificate of compliance/country of origin is required to be provided. Supplier is required to furnish the name of the manufacturer for all the important components and parts.
2.	***Exceptions if any to the specifications should be clearly mentioned along with reasons along with suitable alternate provisions provided to suit the purpose***