

Annexure-1

Technical Specification for Nitrogen & Oxygen Determinator

1. Table top, computer controlled Nitrogen and Oxygen determinator for determination of Nitrogen and Oxygen. Instrument should be capable of simultaneous determination of nitrogen, oxygen in inorganic materials such as ferrous and non-ferrous metals, refractory materials, ores, steel and alloys. Copper, Aluminum oxide, ceramics. Analyses of samples in the form of powder, metal chippings and granules should be possible. If there is a specific requirement in respect of the sample shape and form the same must be mentioned in the quotation.
2. **Software** :Instrument should be PC controlled using Window based application software. Application software must support on-board manuals, advanced diagnostics, automatic leak check and barometric pressure control, extended archiving and flexible reporting capabilities. Software must allow data recall and recalculation of all data buffers. Analysis software with Instrument control, data acquisition and storage, single & multipoint calibration, automatic linearity correction, segmented leak check, hardware diagnostics, statistics, Report generation.
Software must be able to control the furnace power, current and temperature.
Software must have the capability to support oxides/nitrides separation and quantification.
3. PC with specifications as per annexure -3. and printer as per annexure-4:

4. Analysis Requirement: Sample size : in the vicinity of 1 g .

Nitrogen	1 ppm - 2.0 %
Oxygen	1 ppm - 2.0 %

5. Detectors

Nitrogen - Thermal conductivity Cell

Oxygen - Infrared absorption d

Detectors must be independent with no moving parts or manual adjustments and must be isolated in a thermally stable compartment. Selection of suitable detector for measurement based on sample concentration of ON should be automatic. Detector system must ensure good accuracy and precision at low and high concentration of these elements in samples.

6. Instrument should work on single phase, 230V, 50Hz

7. Furnace with cooling system: Electrode furnace capable of melting tungsten carbide.. Water cooling system should be included as standard and must be able to provide sufficient cooling without the need for extra cooling devices. or compatible chiller unit should be supplied.

Furnace power should be controllable from by computer software.

The furnace provided should be able to ensure complete combustion of various samples.

Facility for detaching furnace from the main instrument.

8. Sample Loading: Both manual and automatic loading of sample to the furnace.

9. Electrode Cleaning : Automatic electrode cleaning facility .

10. **Carrier Gas:** Carrier gas purification system must be present to maintain required purity of the carrier gas. Gas flows must be controlled using mass flow controllers capable of dynamic compensation for flow fluctuations. Carrier gas regulator must be quoted. Gas flow circulation system complete with electronic flow control, flow meters, pressure gauge, solenoid valves, gas cleaning equipment.

11. Calibration: Single point and multi point Instrument calibration must be possible with solid standards and gas dosing. Supplier should quote mean value and the attainable precision by the quoted model, on analyzing CRM's , 3-4 Nos covering different ranges of Nitrogen and Oxygen. It should be possible to demonstrate these values during inspection /installation. At least two such CRM's should be supplied along with the instrument.

Software must have automatic high/low oxygen detection.

Software must allow data recall and recalculation of all data buffers

Certified metallic standards for calibration covering the wide range of concentration should be quoted. Quote a minimum of 10 different range standards. The ranges are: 0-2500ppm for O, 0-4000ppm for N. The quantity of standards quoted should be sufficient for 2000 analyses. A comprehensive list of the standards covering the given ranges must be provided to enable selection.

12. The instrument should be supplied with service, operation and other user manuals.