

Computer controlled, Simultaneous, Bench Top, Atomic Emission Rotating Disc Electrode (AES-RDE) type Spectrometer to Specification No.CR / IR /Spectrometer/RDE/Oil/2025**Table of contents**

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In case, any of the conditions mentioned here under are contrary to those mentioned elsewhere in the tender document, conditions mentioned in this document shall supersede the corresponding conditions given elsewhere in the tender document.

IMPORTANT FEATURES OF THE TENDER

1 INSTRUCTIONS TO BIDDERS FOR FILLING TECHNICAL BID

- 1.1 Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards, and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with International (CE/ISO/DIN/JIS)/National standards (IS) (wherever applicable).
- 1.2 Tenderers should offer and quote for all the specified concomitant accessories, as these are considered essential for commissioning and utilization of the machine. Even if bidder does not recommend the purchase of any of these accessories, the price must be quoted for comparison purposes and their recommendation/suggestion to be indicated in the offer. Tenderers should also quote for optional accessories, spares and consumable spares as asked in the specifications.
- 1.3 In case, any item is required in sets, please specify nos./pieces per set. This is essential for proper technical evaluation of the offer. Offers received without this may be considered as incomplete and liable to be rejected.
- 1.4 The bidder should quote only for the specified make of sub-assemblies and equipment wherever specified. Makes of sub-systems other than the specified ones will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over specified makes must be brought out in the offer.
- 1.5 In case there is a contradiction in any information provided (between any parametric values given in the specification and those given in the brochure or some other document enclosed by the tendered), unless specifically mentioned in the deviation cum confirmation statement under Annexure A of Section VI, the values as given in the specification shall be taken as confirmed by the tendered and offer evaluated accordingly.
- 1.6 Bidder or his authorized agent, in their own interest, should visit the consignees listed in clause 3 Section-IV with prior appointment with Controlling Officer of the consignee and acquaint themselves with existing process of manufacturing/remanufacturing, site conditions, availability of material Handling facilities etc.
- 1.7 The Tenderer should also furnish 'Statement of Deviations' from tender specifications (as per Annexure A Section VI) along with the offer.
- 1.8 Bidder shall furnish Clause wise comments and information asked for against various clauses, wherever specified.

2 DESCRIPTION:

The computer controlled, Simultaneous, Bench Top, Atomic Emission Rotating Disc Electrode (AES-RDE) type Spectrometer as per specification No. No.CR/IR/Spectrometer/RDE/Oil/2025 covers manufacture, supply and commissioning of computer-controlled emission spectrometer for analysis of metal and wear contaminants in used hydraulic fluids as listed in Annexure – E of Section-VI in Railway Workshops, Production units, Maintenance sheds etc.

2.1 The Machine shall have the following configuration:

2.1.1 The Spectrometer AES-RDE type, pre-calibrated at manufacturer's place complete with

- a. Optical System,
- b. Frequency Generator Source,
- c. Sample Introduction System/ Sample Stand,
- d. Sample Excitation System, Detection System, i.e. Optical Resolution
- e. Read Out System fulfilling the requirement of ASTM D 6595 test method,
- f. Cooling System (if needed),
- g. Computerized Analytical Control System with LED Display,
- h. Computer Peripherals and Printer along with Operation, Analysis and Calibration Software.
- i. Spectrometer should be simple and user friendly to operate.
- j. The CCD's shall be provided to cover wavelength and focal length of 210 – 800 nm wide leading

- parameters as per clause 2.2. of section – IV.
- k. It should have facility for future expansion of number of channels, if required.
 - l. The spectrometer should be self contained, compact and with modular construction. It should be designed to provide easy access for maintenance and operation.
 - m. The equipment should be suitably tropicalized to meet with the Indian climatic conditions (Temperature- 50° C, Humidity- 98%) during transportation, assembly and operation.
 - n. The general mechanical design of the spectrometer shall conform to Para 3.0 of section-V and the general electrical design shall be as per Para 2.0 of section-V along with its sub-clauses.

2.1.2 The machine should be in compliance of corresponding dimensions as per leading parameter (Schedule– I).

2.2 Leading parameters

Schedule-I

The machine shall conform to the following major & other parameters. The bidder should furnish the values of these parameters at S.N. 1 of Para 11 of the enclosed Annexure A of Section-VI.

LEADING PARAMETERS

2.2.1 MAJOR PARAMETERS

2.2.1.1	Focal Length	0.3 to 1 meter
2.2.1.2	Wavelength Range	210 – 800 nm to cover the entire usable spectrum
2.2.1.3	Detectors Capacity	CCD (Charged Couple Device)
2.2.1.4	Capacity	Minimum 32 channels for elements given in Annexure – E of section VI

2.2.2 OTHER PARAMETERS

2.2.2.1	Grating	Holographic
2.2.2.2	Productivity per 8 hour shift	120 samples
2.2.2.3	Power supply	220V+/-10% @ 50 Hz+/-3%
2.2.2.4	Power Consumptions:	Max. 450 watts during analysis & Max.275 watts on standby
2.2.2.5	Analytical programme for various elements in oil as per RDSO recommendation (Ref: Ann.-I of MP guide no.6, May 2007, Rev-02 of RDSO/LKO)	
2.2.2.5.1	For Locomotives fitted with 251B/251C/251D Type Diesel Engines (WDM2, WDM3A, WDP1, WDP3A, WDG3A, WDS5, WDS6, YDM4 and YDM4A Diesel Locomotives)	

SN	Element	Limits (in ppm)	Abnormal Critical
i	Iron (Fe)	20	50
ii	Copper (Cu)	10	20
iii	Lead (Pb)	5	10
iv	Tin (Sn)	5	10
v	Chromium (Cr)	5	10
vi	Aluminum (Al)	5	10
vii	Sodium (Na)	30	50
viii	Silicon (Si)	15	20
ix	*Boron (B)	10	20

2.2.2.5.2 For Locomotives fitted with General Motors Diesel Engines (WDG4/ WDP4 locomotives)

SN	Element	Limits (in ppm)		
		Normal	Border	Line High
i	Iron (Fe)	0-75	75-125	Above 125
ii	Copper (Cu)	0-75	75-155	Above 150
iii	Lead (Pb)	0-50	50-75	Above 75
iv	Tin (Sn)	0-20	20-40	Above 40
v	Chromium (Cr)	0-10	10-20	Above 20
vi	Aluminum (Al)	-	-	5
vii	Zinc (Zn)	0-10	Above 10	Above 20
viii	Silicon (Si)	0-15	15-20	Above 20
ix	*Boron (B)	0-10	Above 10	Above 20

2.2.2.5.3 For Locomotives fitted with MAK Diesel Engines (WDS4, WDS4A, WDS4B, WDS4C, WDS4D, ZDM3, and ZDM4A locomotives)

SN	Element	Limits (in ppm)	
		Abnormal	Critical
i	Iron (Fe)	40	100
ii	Copper (Cu)	10	20
iii	Lead (Pb)	20	40
iv	Tin (Sn)	5	10
v	Chromium (Cr)	15	30
vi	Aluminum (Al)	15	30

vii	Nickel (Ni)	5	10
viii	Silicon (Si)	15	20
ix	*Boron (B)	10	20

Where Borate nitrite based corrosion inhibitor is still in use, else it is not applicable.

- Note:**
- i No deviation shall be permitted in Major parameters and other parameter clause no. 2.2.2.5 (2.2.2.5.1 to 2.2.2.5.3).**
 - ii The bidder shall furnish the values of individual parameters at S.N. 1 of Para 11 of Annexure-A in Section-VI.**

2.3 Performance Standards:

- 2.3.1 The machine should conform to ASTM D 6595-00 (or latest) or other equivalent international standards ISO or DIN or JIS or ASTM for accuracy / performance test. Detailed sample Test Charts for the same, clearly showing the accuracies to be achieved on the machine for Analytical Analysis shall also be submitted with the offer along with the international standard to which the offered machine confirms, to be indicated in the offer.
- 2.3.2 The analytical accuracy and repeatability should be carried out as per the relevant standard indicated by the bidder with reference to the clause no. 2.3.1.
- 2.3.3 Analyzing time should be such that the same can be maintained for regular 8-hour shift for double shift working seven days a week with machine availability of 85%, without affecting reliability and accuracy of the machine over a working period of at least 15 years.

2.4 Productivity/Cycle Time:

- 2.4.1 The offered machine should be capable of achieving the cumulative Analytical analysis time for oil sample (from start to end) as listed in Annexure – E of Section – VI.
- 2.4.2 The tenderer shall submit a detailed process sheet with details of cycle time for analyzing of wear metal and contaminations in sample as listed in Annexure - E in Section-VI. The process cycle time should consist the activities as furnished in clause 1.2.2.4 of Section-V etc. The information regarding cycle time should be furnished as per format at S.N 4 of para 11 of Annexure-A in section-VI. The bidder should indicate the expected output of the machine at 85% efficiency during 8 hour shift.
- 2.4.3 The process sheet should have the details of basis of arriving at such timings, estimated timings of wear metal and contamination present in sample number of spans etc, any other data considered as relevant should be furnished for each cycle.
- 2.4.4 While calculating output rate or Analytical time, the machine is assumed to be idle for 20% of its available time for sample loading and unloading of sample for analysis. The bidder may indicate his estimate for machine idle time depending upon the machine design and sample holding system offered with machine.
- 2.4.5 The machine is required to give an output rate of 120 samples in 8 Hrs. shift.

2.5 Prove out at firm's premises:

The firm is required to demonstrate pre-calibrated spectrometer for element analysis of oil through standards or any other equipment should be provided for analyzing upto 32 elements in semi-quantitative manner and simultaneous detection capability in PPM range for all elements as given in Annexure-'E' of Section-VI present in sample. (Standards are to be included in the scope of supply with traceability of certificates. If any standard became an obsolete, a similar or nearest standard may be substituted) the following Analytical/ Analysis accuracy & repeatability at the time of inspection in addition to their normal checks carried out during assembly & testing as part of quality control measures to be provided: -

- 2.5.1 Analytical and performance test as per clause 2.3.1.
- 2.5.2 Analysis accuracy & repeatability as per clause 2.4.1.
- 2.5.3 The firm shall be required to prove out the claimed cycle time on respective sample as listed in Annexure - E of Section-VI at manufacturer's premises for 2 Samples for wear metal and contamination.

Note: i. Actual test schemes for samples for the above analysis shall be furnished by the tenderer in the offer.

ii. Standards (which are in the scope of supply) for prove out at Firm's Premises shall be arranged by the firm. Details of standards required for analytical programme for test pieces to be submitted with the offer.

- 2.5.4 Spectrometer required to be supplied with standards for analyzing samples (as mentioned in the specifications) shall be proved out to establish the claimed productivity. The proving out shall be done at the inspection stage itself at supplier's premises for analyzing as indicated in 2.4.2 and 2.5.3. The number of standards/ for analyzing needed for proving out should be indicated by the tenderer.

2.6 Prove out at consignee's works:

- 2.6.1 The firm shall be required to prove out the productivity requirement/claimed cycle time (cycle start to cycle end) on samples for all composition as listed in Annexure - E of Section VI at consignee's end. The consignee's shall provide the required sample/ material for prove out trials. After such successful prove out as herein before the consignee shall take over and watch the machine performance for a period of one month, before the final proving test certificate is issued.

Note:i. Standard Test pieces & other equipment required for installation of the machine and Set of standards for checking for wear metal and contamination etc. should also be brought by the bidder. The bidder can take back these items after installation and commissioning of the machine if these parts are not in the scope of supply.

ii.The bidder shall also be responsible for any deviation/rejection in prove out of all the function of the equipment due to non-conformity of specification or malfunctioning of the machine during proveout cycle time and also for the delay in due to improper recommended standards/material etc. Any changes during prove out shall be at the responsibility and cost of the bidder. The bidder shall supply the changed standards at prove out stage as mentioned in clause 2.4.2 and 2.5.4.

3. QUANTITY & CONSIGNEE:

SN	Consignee	Quantity required	Specification no.
1	Sr.DME(D)Pune	01 No.	No.CR / IR /Spectrometer/RDE/Oil/2025

4. SCOPE OF SUPPLY:

4.1 The scope of supply shall include design, supply, installation, testing, commissioning and proving out of computer controlled RDE spectrometer on turnkey basis. It include all the concomitant accessories/ equipment's as detailed in the specification and other concomitant accessories/ equipment, which the manufacturer considers essential to make the machine fully operational, when installed and commissioned. It shall also include installation and commissioning of related equipment, training of personnel in operation and maintenance of machine as per clause 10.1/10.2 of section V and supply of technical documentation as per clause 4.0 of section V. The Preventive maintenance during warranty and Comprehensive Annual Maintenance Contract after warranty shall be as per clause no. 16&17 respectively of Section-V of specification of this tender.

4.2 CONCOMITANT ACCESSORIES:

The machine should be accompanied with the following concomitant accessories:

- | | | |
|-------|---|--------|
| 4.2.1 | Electrical cables for connecting spectrometer to the power source | 20m |
| 4.2.2 | Operation and maintenance tools. (List to be furnished by the bidder) | 1 set |
| 4.2.3 | Operation and Maintenance manual | 3 sets |
| 4.2.4 | Computer and Peripherals as per clause 1.2.7.1 of Section-V | 1 set |
| 4.2.5 | Online Compatible UPS with 60 Minutes of Battery backup of the Spectrometer and computer system as per clause 1.2.7.1.2 of Section-V | 1 No. |
| 4.2.6 | Software as per clause 1.2.7.2 of Section - V | 1 set |
| 4.2.7 | A Set of Reagents/ Materials/ Oil Standards for elements asspecified in Leading Parameters under clause 2.2 of Section-IV & elements furnished in Annexure-E of section-VI required for 1000 samples asfollows:-
a) Base oil
b) Check Oil Standard
c) Cleaning Solution to remove spilled or splashed oil sample
d) Organometallic Standards (single or multi-element blended) for instrument standardization or re-calibration | |

(Technical description, concentration, sources of supply, Quantity of bottles to be indicated by bidder in each case) – 1 set

4.2.8 A set of electrodes for 1000 samples conforming to ASTM D 6595, comprising of following: -

- a.) Graphite disc electrode b.) Graphite rod electrode

(Technical description, size, sources of supply, Quantity to be indicated by bidder in each case)

- 4.2.9** Electrode Sharpener - 01 no.
- 4.2.10** Disposable sample holders for 1000 samples - 01 set
- 4.2.11** Ultrasonic bath to heat and homogenize used oil samples - 01 set
- 4.2.12** Apart from the above concomitant accessories, any other accessory/equipment/consumables essentially required to make the spectrometer fully operational/functional when installed and connected to power source, shall also be included in scope of supply and quoted by the bidder separately.
- 4.3 OPTIONAL ACCESSORIES:**
- Following optional accessories will be quoted by the tenderer. Cost of optional accessories shall be quoted separately and shall not be included in the basic price of the machine. Cost of optional accessories will not be taken for commercial evaluation of the firms.
- 4.3.1 Source frequency test meter
- 4.3.2 Automatic robotics system with sample changer
- 4.3.3 Transit case for transportation of spectrometer making its versatile for onsite requirement
- 4.3.4 Re-usable sample holder with cover for low flash point samples
- 4.3.5 Ultrasonic cleaner with basket
- 4.3.6 Reusable sampling pump
- 4.3.7 Sample holder cleaning solution (Details to be furnished)
- 4.3.8 Sampling containers (Details to be furnished)
- 4.3.9 Additional analytical channels (over basic configurations)
- 4.3.10 Sulphur analysis attachment along with Set of Reagents/ Materials/ Oil Standards for sulphur (refer clause 1.2.6.5 of Section-V) - 1 set
- 4.3.11 List of capital spares to ensure quick reaction to failure/breakdowns during the warranty period and to support maintenance in the post warranty period.
- 4.3.12 Apart from the above optional accessories any accessory, which can improve the capabilities of the spectrometer, may be quoted separately, bringing out its advantages clearly.

5. EVALUATION CRITERIA

Total value of the offer will be calculated based on

- i. The cost of the basic machine, Cost of the concomitant accessories, Cost of Preventive maintenance during warranty according to tender specifications
- ii. Cost of Turnkey Charges viz.foundation, installation & commissioning etc.
- iii. Net Present Value (NPV) of the total Cost of comprehensive AMC for five years after the warranty as per clause 17 of Section-V.
- iv. Duties and taxes as quoted by the bidder, insurance and freight.

6. OTHER ITEMS TO BE QUOTED:

The following items will need to be quoted additionally though will not be part of commercial evaluation:

- i. Optional Accessories with break-up of individual items as specified in clause 4.3 of section IV
- ii. Spares for two years normal operation and maintenance as per clause 5 of section V
- iii. Consumables as per clause 6 of section V with break-up of individual items as applicable

7. DELIVERY SCHEDULE CHART:

Name of the Machine: COMPUTER CONTROLLED BENCH TOP ROTATING DISC ELECTRODE SPECTROMETER

In the event of acceptance of the offer, the machine(s) shall be supplied as per the following Milestone

S. No.	Activity	Activity Code	Outer Limit of Time Schedule expected by CENTRAL RAILWAY
1.	Issue of LOA	D1	-
2.	Submission of PBG By Successful Bidder	D2	D1 + 30 days
3.	Issue of Contract by Central Railway	D3	D2 + 30 days
4.	Submission of GA drawings and requisition for the trial component (s) (if applicable) to consignee by Successful Bidder/Supplier along with information on power and other utilities required for machine.	D4	D3 + 30 days
5.	Approval of GA drawings by consignee (to be governed by clause 11.2 of Section-V) and confirmation of availability of components to be proved out at manufacturer premises and value of BG required for providing prove out components.	D5	D4 + 30 days
6.	Confirmation of availability of clear site by consignee	D6	By D5
7.	Completion of foundation	D7	Latest by D10
8	Supply/ Delivery of machine	D8	D5 + 180 days
9	Power connection for the machine and other onsite requirements to be provided by railways	D9	D9 +7days
10	Railway to give call to supplier for the commissioning of machine	D10	D9 +7days
11	Installation, commissioning and proving out of machine by supplier	D11	D10 + 30
12	Issue of PTC by consignee	D12	D11 + 30 days
13	Warranty by supplier	D13	D12 + 2 years
14	Comprehensive Annual Maintenance Contract	D14	D13 + 5 years

Note: Notwithstanding the delivery period indicated elsewhere in the tender document, the delivery indicated in this schedule shall be taken as overriding and final.

8.0 Payment Terms :-

- 8.1 **Payment for supply of machine** - 80 % amount of the cost of Machine along with Concomitant Accessories shall be released against I/C issued by the TPI agency and Joint Receipt Inspection Note as per Annexure B of Section – VI duly certified by the consignee gazetted officer and Balance 20% payment shall be released on issue of Prove Out Test Certificate (PTC) as per Annexure I of Section – VI against submission of WBG for 10 % of the value of contract (excluding CAMC charges) towards security for warranty period valid till 02 months beyond the expiry of warranty period.
- 8.2 **Payment for construction of Foundation, Installation, Testing, Commissioning and Proving out** – 80% on issue of Joint Commissioning Note as per Annexure – C of Section – VI by the consignee and Balance 20% on issue of Prove Out Test Certificate (PTC) as per Annexure I of Section – VI along with submission of WBG valid till 02 months beyond the expiry of warranty period.

Note: The supplier shall arrange certification by an RCC Consultant, who should be a Chartered Engineer registered with the Institution of Engineers, that: -

- a) The design of the machine foundation &
- b) Construction of the foundation is in accordance with the latest version of the relevant part of the Indian Standards for Code of Practice for design & construction of machine foundation as specified in IS:2974.

The original certificate issued by the consultant for certification of both the design & construction of the foundation and a copy of his registration certificate from the Institution of Engineers shall be submitted by the supplier to the consignee.