CFF/SMS/2017/01 Rev. No. 00 Date: 28/09/2017	TECHNICAL SPECIFICATION FOR OPTICAL EMISSION SPECTROMETER	

Cl. No	Clause Details
1.0	**Objective:** The purpose of the equipment is to obtain quick and precise analysis of the elements in plain carbon steel, low alloy steel, creep resist steel, stainless steel, cast iron, stellite material, babbit material.& Advacned Ultra Super Critical Steels (iN625 grade). The equipment should be c emission type and capable of analyzing the elements in various bases simultaneously as given in Annexure-I. Nitrogen in super-critical grades of steel in high alloy steel calibration is of prime importance as given in Annexure-2.
2.0	**Scope:** This technical specification covers the supply, installation and commissioning of laboratory model Optical Emission Spectrometer complete with necessary auxiliary equipments.
3.0	**Technical Requirements:**
3.1	The system should be of latest design from the manufacturer ranges with wavelength coverage to suit our analytical requirements as per Annexure-1 enclosed.
3.2	Excitation source shall be Point to Plain Technique with of latest design with high precision capable of handling low to high concentration for various elements in different matrices.
3.3	The equipment offered should confirm to: a) ASTM E-1507-98(2003): Standard Guide for Describing and Specifying the Spectrometer of an Optical Emission Direct-Reading Instrument. b) ASTM E-1009-95(2006): Standard Practice for Evaluating an Optical Emission Vacuum Spectrometer to Analyze Carbon and Low-Alloy Steel. c) ASTM E 1086-08 : Standard Test Method for Optical Emission Vacuum Spectrometric Analysis of Stainless Steel by the Point-to-Plane Excitation Technique. Supporting data must be provided with the offer.
3.4	Other than global calibration the instrument shall be pre-calibrated as per our analytical programme for various matrices. Details for calibration for Iron base matrices as per Annexure-2. Calibration for Cobalt base (stellite material) & Tin base (Babbit material) alloys will be to cover ranges as per Annexure-1. In addition, sufficient number of standard samples for calibration and drift/ setting up should be supplied (free of cost) as per Annexure-1. Also all Standard samples desired shall be supplied by the vendor.
3.5	Optics shall be under temperature controlled vacuum tank/inert atmosphere.
3.6	Instrument shall be provided with automatic profiling system.
3.7	Instrument shall be provided with necessary operating Software.
3.8	Operating Software shall be compatible with latest Operating System available in the market atleast for another10 years.
3.9	Instrument shall be capable of sustaining normal Industrial vibrations of Steel Melting Shop.
3.10	Built in safety devices towards power failure, power dip, voltage & frequency fluctuations be provided.

3.11	Photo-Multiplier Tubes shall be used as detector which shall have the capability to sense the particular wavelength of an element in the matrix ,which is free from all interferences .However if necessary,system should apply minimum inter element correction.
3.12	Supplier shall supply UPS (min. 3 KVA) & Voltage Stabilizer of suitable capacity to run the spectrometer (UPS must atleast provide 20 minutes power back-up).
3.13	Various details of the grating viz. grooves/mm wavelength covered, resolution, linear dispersion etc. must be provided with the offer.
3.14	Optical layout program shall be provided along with the offer giving wavelength, order of the line, concentration ranges.
3.15	PC Specifications (minimum requirements)alongwith application software for Spectrometer: MAKE: DELL/HP/APPLE/Lenovo, Atleast 22" LED screen monitor, Processor: Core-I5, 7th generation or better,RAM: 8GB or more, Video Card : 1 GB Video Card or above, Hard Drive: 1 TB or more, DVD Drive, UPS capacity:800 VA with minimum 20 minutes back-up, Operating System: Windows 10, Software : Microsoft Office 2010-Latest version preloaded, other as per requirement of system, Security Software: AntiVirus: 12 month subscription, All connection cables , relevant connectors & ports with necessary tools for operation and maintenance of microscope should be provided.
3.16	The application software shall have automatic data storage and statistical process control.
3.17	Self-diagnostic facilities for any kind of malfunctioning for the entire system shall be provided.
3.18	Instrument shall be virtually drift free over a period of min. 8 hours. Data to prove that this condition is met shall be supplied.
3.19	Instrument shall be capable of displaying the result at two places: one at the PC & one at the remote station located at a distance of 200 meters or above away through LAN.
3.20	The components of the equipment shall be designed generally in accordance with the Indian / international standards where ever available.
3.21	The power supply available in the laboratory is 230± 10% volts, AC, single/ 415±10% volts,three phase, 48-50 cycles per second.
3.22	Recalibration samples required for matrices to be configured in ferrous base, copper-base, aluminium-base, tin-base, cobalt-base, nickel-base will have to be supplied by vendor in sufficient quantity.
3.23	Ferrous base, Aluminium-base,Nickel-base, Copper-base, Tin-base, Cobalt-base standard samples required for routine verifications of values obtained in equipment will have to be supplied by vendor in sufficient quantity.
3.24	High speed disc grider with atleast 60 nos. of polishing plates will have to be supplied by vendor.
3.25	Regulator for Argon gas cylinder (stainless steel body) will have to be supplied by vendor.

4.0	**THE SUPPLIER SHELL ALSO GIVE THE FOLLOWING GENERAL INFORMATION ABOUT THE EQUIPMENT:**
4.1	Model No.
4.2	Weight
4.3	Overall dimension

4.4	Space requirement
4.5	Consumption of electricity
4.6	Purity and consumption figures for argon or any other gas used, with number of sparks in one standard cylinder of 7 meter^3 capacity at 150 Kg/cm^2.
4.7	Working temperature range & humidity.
4.8	Design life & minimum period of available of spares after commissioning.
4.9	Auxiliary equipments details.
4.10	Requirement of test sample size.(Min & Max size)
4.11	Year of launching the model offered.
5.0	**General Requirements:**
5.1	SUPPLIER MUST ANSWER IN DETAIL, POINTWISE ALL THE CLAUSES OF THE TENDER TO ENABLE CONSIDERATION & EVALUATION.
5.2	Supplier shall provide a list of users in India for instrument system quoted giving name of organization, contact person, department address, FAX / Telephone number/email address /year of supply etc.
5.3	BHEL reserve the right to verify the information submitted by the vendor. In case the information is found to be incorrect the offer shall be rejected.
5.4	Optional accessories / attachment which can enhance performance / application of equipment must be quoted separately.
5.5	Supplier should submit along with quotation legible and sufficient technical literature in English language to understand its technical and application details. Attaching just a promotional brochure will not be sufficient.
5.6	Supplier shall provide detailed operation & maintenance manuals along with all circuit diagrams in soft copy (pen drive/portable hard disk) & also two sets of hard copies in English only.
5.7	The detailed addresses, tel. Nos. of the service station along with details of factory trained personals be submitted.
5.8	Supplier shall mention the minimum time required for attending Beakdown,if any
5.9	Suppliers shall inform availability of spare parts with service center in India and shall ensure the availability of spares for ten years.
5.10	Facilities for annual maintenance of the equipment to be mentioned in the tender along with the cost details.
5.11	Instrument shall be guaranteed for good working for at least two years from the date of commissioning. If instrument remains out of order during this period, guarantee period will stand extended for the corresponding period. If any manufacturing defect is noted during guarantee period, it will be rectified free of cost within guarantee period/extended gurantee period.
5.12	The equipment shall be commissioned at our works by the manufacturer free of cost. All capabilities of the instrument and accessories shall be demonstrated. Also hands on training will be given to the users personal to enable them to operate / maintain instrument successfully.
5.13	Pre inspection at manufacturer's works. Manufacturer shall demonstrate the ability of equipment to meet BHEL/CFFP requirement.

5.14	Supplier shall provide training for minimum two weeks to two personnels at manufacturer's works for successful Technical operation & maintenance of the equipment.
5.15	Equipment shall be supplied packed properly to bear transportation by air, ship & road routes.
5.16	Equipment shall confirm to international safety norms.
5.17	All items of this equipment will be complete in all respects and the supplier shall also include every equipment not covered in this specification but considered essential for proper operation of the equipment.
5.18	The supplier shall supply a list of recommended spares & consumable and quote separately item wise prices for them required for five years operation of the equipment.
5.19	Supplier shall provide essential tools for commissioning and maintenance of the equipment.
5.20	Supplier shall clearly specify in the offer any support facility /equipment require from buyer for installation / commissioning / operation of the spectrometer.
5.21	Supplier shall quote his best and earliest delivery.

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Annexure-2

CALIBRATION REQUIREMENT

Elements	Low Alloy Steel %	High Alloy Steel %	Cast Iron %
C	0.01-1.000	0.01-0.800	2.000-4.500
S	0.001-0.070	0.001-0.070	0.020-0.100
P	0.001-0.070	0.001-0.070	0.020-0.100
Si	0.010-1.000	0.010-2.500	1.000-2.000
Mn	0.010-2.000	0.010-7.00	0.300-1.000
Ni	0.010-4.000	0.100-20.000	0.010-0.200
Cr	0.010-4.000	1.000-30.000	0.010-0.100
Mo	0.010-1.500	0.050-2.500	0.001-0.020
V	0.010-1.000	0.010-0.500	-
Cu	0.010-1.500	0.010-0.200	0.010-0.200
Al	0.001-1.000	0.001-1.000	0.001-0.050
Ti	0.001-0.200	0.001-0.200	0.001-0.050
Sn	0.001-0.300	0.001-0.300	0.001-0.020
As	0.0001-0.100	0.001-0.100	0.001-0.020
Sb	0.0001-0.100	0.001-0.100	-
B	0.0001-0.020	0.0001-0.020	0.0001-0.010
Co	-	0.001-2.000	-
W	0.001-0.500	0.010-2.000	-
Pb	0.001-0.100	0.001-0.100	0.0001-0.010
Nb	-	0.010-1.000	-
Mg	0.001-0.100	-	-
Ca	0.0005-0.100	0.0005-0.100	-
N*	0.0050-0.030	0.010-0.1500	-
Zr	-	0.0001-0.050	-

* Analysis of Nitrogen in low & High alloy steels is of prime importance

Annexure-1

ANALYTICAL REQUIREMENTS

Elements	Iron base %	Cobalt base %	Tin base %	Nickel Base %	Aluminium Base %
C	0.005-4.40	0.800-1.500	-	0-0.05	
S	0.001-0.200	-	-	-	
P	0.001-0.200	-	-	0-0.01	
Si	0.010-3.500	0.010-3.500	-	0.2-0.4	10-13
Mn	0.010-7.000	0.010-1.500	-	0.4-0.6	0.3-0.7
Ni	0.010-40.00	0.010-5.000	-	0-balance	0.1 max
Cr	0.001-30.00	20.000-35.000	-	20-23	
Mo	0.001-2.50	0.010-2.500	-	8-10	
V	0.005-2.00	-	-		
Cu	0.010-2.00	-	1.000-8.000		0.1 max
Al	0.001-1.80	-	0.001-0.050	0.2-0.3	Remainder
Ti	0.001-1.00	-	-	0.2-0.3	0.2 max
Sn	0.001-0.50	-	Base		0.05 max
As	0.0001-0.20	-	0.001-1.000		
Sb	0.0001-0.20	-	7.000-15.000		
B	0.0001-0.10	-	-		
Co	0.001-2.00	Base	-	0-1	
W	0.001-6.00	2.500-7.000	-		
Pb	0.0001-0.30	-	0.001-0.500		0.1 max
Nb	0.002-2.00	-	-		
Mg	0.001-0.12	-	-		0.2-0.6
Ca	0.0005-0.10	-	-		
N	0.0050-0.1500	-	-		
Fe	Base	0.010-4.000	0.001-0.100	0-2	0.6 max
Zr	0.0001-0.100	-	-		
Zn	-	-	0.001-1.000		0.1 max
Cd	-	-	0.010-2.000		
Bi	-	-	0.001-0.100		
Ag	-	-	0.010-0.300		
				3.15-3.5	