

Specification No. CFF/QM/MET. LAB/01 REV.00/DATE- 13.11.17	
SPECIFICATION: METALLURGICAL MICROSCOPE WITH IMAGE ANALYSIS SOFTWARE, CCD CAMERA	
SN	REQUIREMENTS
1.00	Equipment should have a high quality Inverted Optical Metallurgical Microscope for reflected light bright field, dark field and interference contrast studies with a CCD Camera, Image Analysis Software
2.00	Specification for Optical Microscope:
2.01	Equipment should have a high quality Inverted Optical Metallurgical Microscope for reflected light bright field, dark field and interference contrast studies. The sample has to be kept at the top in inverted position and viewed from bottom.
2.02	Should be a reputed microscope such as Buehler/Olympus/Leica/Carl-Zeiss/Reichert make etc.
2.03	Microscope stand with RS232 interface for PC Connection with attachments, magnifications and other functions to be displayed on LCD Screen.
2.04	High Quality optics for obtaining high-resolution images of good contrast and image homogeneity. Optics must be free from chromatic aberrations. The latest optics available should be quoted. The characteristics of the optics and the incident light illumination aspects to achieve optimum homogeneous illumination and intensity have to be clearly specified with necessary documents.
2.05	Binocular phototube for photomicrography.
2.06	Wide field eye pieces of magnification 10x. Field of view should be indicated.
2.07	Revolver: Quintuple Nosepieces (minimum).
2.08	Objectives should be of high Quality. Various objectives i.e., for bright field and dark field combination should be quoted.
2.09	Infinitely Plan Achromatic Objectives 5x to 100x/dry i.e. (5x/10x/20x/50x/100x) Cost of individual objectives must be quoted separately.
2.10	Optional motorized magnification changer 1x, 1.5x and 2x for higher magnification.
2.11	Illumination Sources: 2 light sources i) Halogen lamp/12V, 100 W long life halogen lamp equipped with frosted glass & yellow, green and blue filters. ii) High intensity mercury/xenon lamp (with filters). iii) Provision for quick and easy change over between these two light sources
2.12	Objective motorized nosepiece should have provision for keeping minimum 5 objectives with bright field/dark field provision.
2.13	Interference Contrast Provision should be a built in feature.
2.14	Reflected light and oblique illumination with motorized reflected turret, illumination magnification.
2.15	Microscope Stage: Suitable 3 plate mechanical motorized stage with 3 position large stage plate with a removable insert and central opening for reducing stage inserts 20, 30 or 40mm diameter. Detachable handles for specimen rotation, stage clip, right hand x/y drive long version, travel range x/y 60x40mm with micrometer attachments and fine movement in X and Y axis.
2.16	Microscope should have suitable C mount facility for attaching video camera for image processing and should provide 1:1 image area as seen through the eyepiece.
2.17	Microscope should have length measurement graticules with calibrated grids and inclusion counter graticules.
2.18	Provision for coarse and fine adjustment knobs with scales with manual Z-drive.
2.19	Electrical Power supply input: AC 200-240V, 50/60Hz.
2.20	Should have provision to measure accurately surface pit depth or eroded areas in microns.
2.21	Macro-dual zoom facility with range 1:1 to 16:1
2.22	Microscope should work standalone too without pc, if needed.

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2.23	Photography: Colour CCD Camera with photo automatic attachment: High resolution colour digital fire-wire camera for image capturing from optical microscope with the following features: a) Colour CCD camera of reputed make for quality image transfer to a PC. b) Colour Digital Camera (16-megapixel equivalent or more) of reputed make for capturing the image directly in the digital camera. Both the CCD and digital cameras should be attached with the microscope in different ports. Storage should be in the form of SD/CF cards of 16 GB capacity. Additionally one extra SD/CF card of 16 GB or more should also be supplied. c) Automatic calibration facility along with automatic intensity intelligence control. Interline Transfer Frame Readout CCD Sensor d) RGB Mosaic Colour Filter e) Electronic Global Shutter Control f) High Resolution 5.0 Mega Pixel or Better g) Fast Live Image on Computer Screen h) Shading / Brightness Correction possible on all formats i) Adjustable ROI & Adjustable Binning. j) 36 bit colour depth; 12 Bit Dynamics/Digitization
3.00	Specification for Image Analysis Software:
3.01	Image processing system should possess Measurement modules as per relevant different ASTM, DIN, IS, ISO standards for metallurgical analysis for microstructural features such as: <i>Grain size, phase percentage/area distribution, coating thickness, de-carburisation depth, nodular rating, phase analysis, Inclusion-Rating, particle sizing, volume content of multiphase samples, relief measurement, morphometric measurement for grains and artifacts, porosity evaluation, Non-metallic inclusions, Graphite flake size, classification/types & Graphite type percentage, Porosity in metals, etc.</i>
3.02	Softwares available for quantitative evaluation of features, image enhancement & contrast, Image Editing etc. shall be quoted separately.
3.03	Latest version of image analysis software with software C.D. Images can be stored in bmp, tiff, gif, jpeg formats. Latest version of USB camera with 5 mega pixel. The Image Analysis Software should be well tested, known and proved.
3.04	Software bugs, if any, will be solved & if we develop in near future upgrades of software, during the guarantee period the same will be supplied free of cost.
3.05	Transmitted Light Application facility complete with condensers, illumination and automatic contrast managing ability also to be quoted.
3.06	Generating reports containing images, data tables and graphs. Report templates shall be stored into internal format and export into PDF or RTF file
4.00	General Requirements:
4.01	Following separate Manuals 03-sets each should be provided in English Language only for all above 2-3-4 items: a) Installation Manual. b) Operation Manual. c) Maintenance Manual. d) Calibration Manual.
4.02	Essential Spares and consumables For Continuous Trouble Free Operation also to be quoted for 5 years.
4.03	The supplier should ensure that the spares should be made available for the next 10 years from date of commissioning at CFFP, Haridwar.
4.04	Free of cost training shall be provided by the vendor on operation of Microscope, Micro-Hardness Tester and software at CFFP BHEL Haridwar.

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4.05	03 years comprehensive warranty including all parts/accessories of the system. Sufficient number of rapidly wearing and consumable parts is included to cover the Guarantee period.
4.06	Quotation will be considered only if it is submitted with the list of various organizations (including in India) with their contact addresses, where the Inverted Metallurgical Microscope, Micro-Hardness Tester & Imaging Software (same model or similar type) has been supplied in last 3 years.
4.07	Servicing facilities: The supplier or his agent in India should have trained personnel for repairing and servicing the microscope at CFFP, BHEL Haridwar.
4.08	Installation and Commissioning by the vendor shall be carried out at CFFP, BHEL Haridwar.
4.09	The supplier shall provide 24 months warranty from the date of commissioning.
4.10	The supplier shall provide min. 5 years of Annual Maintenance Contract & Calibration service on expiry of warranty period. The yearly charges for the same may be quoted.
4.11	The commercial quotation to be divided in two parts: a) Hardware-Software. b) Pre-delivery inspection and training.
4.12	All the technical specifications should be supported with printed catalogue giving complete description and operational details along with photographs of the microscope from the respective principals.

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