1. **Technical Specifications Annexure 1**

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| --- | --- | --- | --- |
| **Detail** | | **Yes(Y)/ No(N)** | **Bidders’ Response** |
| **01.NDT Unit** | |  |  |
| **01.1 Eddy Current Testing Machine** | | | |
| Application | Detection of surface breaking and near surface planar defects by sing eddy current |  |  |
| Frequency | 10 Hz–10 MHz |  |  |
| Gain/noise | 0~99dB continuously adjustable, stepping: 0.1dB |  |  |
| Evaluation mode | The evaluation mode uses both phase analysis and amplitude analysis of vector traced to the complex plane display. Evaluation may be by comparison of this display with reference data previously stored. |  |  |
| Signal display | As a minimum, the signal display shall be a complex plane display with the facility to freeze data on the screen until reset by the operator. The trace shall be clearly visible under all lighting conditions during the testing. |  |  |
| Phase control | The phase control shall be able to give complete rotation in steps of no more than 10° each. |  |  |
| Detection thickness (45# steel) | 10 - 30mm |  |  |
| Maximum lift off | 10 mm |  |  |
| data acquisition | Up to 50 000 samples/s |  |  |
| smartmux eca channels | 64, 128, 256 |  |  |
| ect probe inputs | 8 |  |  |
| iris turbine speed | Up to 100 RPS |  |  |
| typical battery autonomy | 5-8 Hours |  |  |
| Probes | SUPPORTED INSPECTION TECHNOLOGIES have to be ECT, ECA, TECA, RFT, NFT, NFA, MFL, IRIS |  |  |
| Accessories (Calibration block) | Metal Block A calibration block have EDM (Electric Discharge Machined) notches of 0.5, 1.0 and 2.0 mm depth. Tolerance of notch depth shall be ± 0.1 mm. width of notch shall be ≤0.2 mm. Non-metallic sheets Non-metallic flexible strips of a known thickness to simulate the coating or actual coatings on the calibration block shall be used. non-metallic flexible strips be multiples of 0.5 mm thickness. |  |  |
| Operating Temperature | (5ºC) - (+45ºC) |  |  |
| Computer Data Acquisition System | Required |  |  |
| Manufacturer | ISO9001 certified |  |  |
| Warranty | 5 year or more |  |  |
| **01.2 Magnetic Particle** **Testing Machine** | | | |
| Application | Detection of surface imperfections in ferromagnetic forgings, castings and welds including the heat affecting zones using the continuous wet or dry method. |  |  |
| Magnetizing current | AC+AC、AC+DC（single phase half-wave rectification）、 DC（single phase half-wave rectification）＋DC（single phase half-wave rectification） |  |  |
| Max. magnetizing current | AC2500A、DC1500A（single phase half-wave rectification） |  |  |
| Magnetizing time | 0.1 ～ 3.0sec（set by timer） |  |  |
| Magnetizing method | Axial current method ＋ Coil method |  |  |
| Power supply | AC 3phase、200/220V、50/60Hz、Approx.150A |  |  |
| Black-Light | Super-Light |  |  |
| Cycle Output: | 5000 Amp FWDC |  |  |
| 24,000 Ampere Turn Coil FWDC |  |  |
| 4000 Amp AC |  |  |
| 7500 Ampere Turn Coil AC |  |  |
| Three selectable mode | Up to 4000 amp AC |  |  |
| 2500 amp HWDC |  |  |
| 5000 amp FWDC |  |  |
| Distance between electrodes | < 600mm |  |  |
| Floor Space required | 36″ X 86″ - 36″ X 60″ |  |  |
| Weight: | 500-700 kg |  |  |
| Tank Capacity: | 75-100 Lts |  |  |
| Detecting media | Dry powder or liquid form and the magnetic particles shall be either fluorescent . The detecting media shall be traceable to a batch certificate or data sheet documenting compliance with a national or international standard. |  |  |
| Others | Auto-Demag cycle |  |  |
| Pneumatic head and tail stock |  |  |
| Coil Diameters 16″ or 20″ |  |  |
| Hood and Fan included |  |  |
| Operating Temperature | (5ºC) - (+45ºC) |  |  |
| Accessories | Calibration blocks are needed |  |  |
| Manufacturer | ISO9001 certified |  |  |
| Warranty | 5 year or more |  |  |
| **01.3 Liquid Penetrant Testing** | | | |
| Application | Detection of surface breaking and near surface planar defects (example welding defect) |  |  |
| Penetrant |  |  |  |
| Appearance | Dark-red liquid |  |  |
| Specific graviy | 1 - 0.8 |  |  |
| Corrosive Properties(g/ml) | No evidence of corrosion |  |  |
| Flash point /’’C | ≥25 |  |  |
| Washabilty | Easy to wash |  |  |
| Sensitivity | level 1 |  |  |
| Stability | Qualified |  |  |
| Viscosity/mm2/s | 3.5 - 4.0 |  |  |
| Remover |  |  |  |
| Appearance | Colorless transparent liquid |  |  |
| Specific graviy | 0.69±0.01 |  |  |
| Corrosive Properties(g/ml) | No evidence of corrosion |  |  |
| Flash point /’’C | ≤ (-6) |  |  |
| Washabilty | Easy to wash |  |  |
| Sensitivity | To be used with DPT-5 penetrant |  |  |
| Stability | Qualified |  |  |
| Viscosity/mm2/s | 1.4 - 1.8 |  |  |
| Developer |  |  |  |
| Appearance | White suspension |  |  |
| Specific graviy | ≥0.81 |  |  |
| Corrosive Properties(g/ml) | No evidence of corrosion |  |  |
| Flash point /’’C | ≤ (-6) |  |  |
| Washabilty | Easy to wash |  |  |
| Sensitivity | To be used with DPT-5 penetrant |  |  |
| Stability | Qualified |  |  |
| Viscosity/mm2/s | 0.8-1.2 |  |  |
| Accessories | Calibration blocks are needed |  |  |
| Manufacturer | ISO9001 certified |  |  |
| Warranty | 5 year or more |  |  |
| **01.4 Ultrasonic Testing Machine** | | | |
| Application | Detection of inside crack/ defect of object by using ultra sound waves |  |  |
| Channels | Four Channels |  |  |
| Master Mode | ARM A8 1GHz |  |  |
| Operating System | Windows compatible OS – interface with user friendly |  |  |
| Sampling Mode | Synchronous Sampling |  |  |
| Display Mode | 10.4 inch industrial bright LCD screen 1024\*768 |  |  |
| Operating Mode | Imports of industrial resistive touch screen |  |  |
| Storage Mode | (16GB)Electrical Hard Disk |  |  |
| Depth Measurement Mode | Two-way Counting and Real-Time Repetition Measurement |  |  |
| Intervals of Sampling | 0.03μs ~1024μs |  |  |
| Phonatory Time Measurement Accuracy | 0.03μs |  |  |
| Phonatory Time Measurement Range | 2×106μs |  |  |
| Record Length | 0.5~4k |  |  |
| Transmit Voltage(V) | 50/250/500/1000 Adjustable |  |  |
| Dynamic Range of Gain | 85-95 dB |  |  |
| Control Accuracy of Gain | 0.4±0.01 dB |  |  |
| Test Profile | Six sections |  |  |
| Transmit Pulse Width | 20μs |  |  |
| Broadband | 2~500kHz |  |  |
| Receiver Sensitivity | ≤10μV |  |  |
| Inter-channel Cross-talk | ≤-60dB |  |  |
| Data-Transmission Mode | USB2.0 High-speed interfaces and USB Transmission |  |  |
| Power-Supply Mode | Built-in Lithium Battery(Working Hours≥8 Hours ) |  |  |
| Operating Temperature | (-10ºC) - (+45ºC) |  |  |
| Main Machine Dimensions | 325×243×56mm |  |  |
| Main Machine Weight | 3.5kg-5.0 kg |  |  |
| Others | Intelligent Search, Real-time Control of Sampling in all Channels, Parameters of Dynamic sound , Automatic Interpretation, Cryptographic Measurement, Repetition Measurement. |  |  |
| Counting Device | 4 Slots |  |  |
| Direction | Two-way Counting |  |  |
| Resolution Ratio | 0.3±0.05 cm |  |  |
| Space between Measuring Point | 5cm~100cm, Optional |  |  |
| Max Hoisting Speed | Six sections, up to 60 Meters per minute |  |  |
| Accessories | Calibration blocks are needed |  |  |
| Warranty | 5 year or more |  |  |
| Computer Data Acquisition System | Required |  |  |
| Manufacturer | ISO9001 certified |  |  |
| Warranty | 5 year or more |  |  |
| **01.5 Thermal/Infrared Testing Machine** | | | |
| Application | Analyze and display a thermal field(temperature) distribution on the object surface by using Infrared waves |  |  |
| Working temperature | -20ºC~50ºC |  |  |
| Storage temperature | -40ºC~60ºC |  |  |
| Working wavelength | Long wave 8~14μm |  |  |
| Image schema | Manual/automatic |  |  |
| Focusing type | Manual |  |  |
| Pseudo color | Hot black/white/red/red iron oxide/rainbow/feathers red |  |  |
| Temperature measurement accuracy | ±2º or showing data ±2% |  |  |
| Temperature measurement range | -20ºC~250ºC |  |  |
| Temperature display | Yes |  |  |
| USB mode | Micro SD card/real-time transmission mode |  |  |
| Reflective temperature correction | Manually enter |  |  |
| Alarm temperature | Highest temperature/lowest temperature |  |  |
| Temperature capture | Highest temperature/temperature/lowest average temperature |  |  |
| Radiation rate input | Can be adjusted by the 0.01 ~ 1.0 |  |  |
| Working power supply | Built-in lithium battery |  |  |
| Video output interface | HDMI interface |  |  |
| Accessories | Calibration blocks are needed |  |  |
| Computer Data Acquisition System | Required |  |  |
| Manufacturer | ISO9001 certified |  |  |
| Warranty | 5 year or more |  |  |
| **01.6 Vibrational Testing Machine** | | | |
| Application | analysis vibration of machine part |  |  |
| Vibration Sensor | Separated charge-amplifier and build-in acceleration transducer |  |  |
| Frequency response range | MV 800-5 : 5Hz ̴ 10KHz ; MV800-10 : 10Hz ̴ 10KHz |  |  |
| Measurement range (Displacement) | 0.001-199.9mm (Peack to peak :valid value\*2√2) |  |  |
| Measurement range (Speed) | 0.1-199.9mm/s (valid value) |  |  |
| Measurement range (acceleration) | 0.1-199.9m/s2(peak value: valid value\*√2) |  |  |
| Measurement accuracy | ±5% measured value |  |  |
| Indication error | ±2 |  |  |
| Frequency range | 10Hz - 10KHz |  |  |
| Display mode | 3-digit Semi liquid crystal dispay |  |  |
| Sampling period | 1s |  |  |
| Output signal | AC 2v(peak value,full measurement above 10k) |  |  |
| Dimensions | 185mm\*68mm\*30mm or similer |  |  |
| Power model | 6F22 9v packed cells |  |  |
| Battery life | continuouns use for 25 hours or more |  |  |
| Operating temperature range | -20ºC~50ºC |  |  |
| Computer Data Acquisition System | Required |  |  |
| Manufacturer | ISO9001 certified |  |  |
| Warranty | 5 year or more |  |  |
| **01.7 X ray Testing Machine** | | | |
| Application | Determination of inside and surface crack and dimension of the object( machine part) by using X-ray |  |  |
| Tube voltage | 70 kV ~ 200 kV in steps of 2 kV |  |  |
| Tube current | STD mode 5 mA (at 90 kV or more) |  |  |
| LOW mode ~ 4 mA (at 90 kV or more) |  |  |
| Duty cycle | Intermittent continuous (1:1 Max. 6 min at 25°C) |  |  |
| X-ray tube | Ceramic X-ray tube Focal spot size (nominal) 2.0 mm x 2.0 mm |  |  |
| Inherent filter | Aluminum 2 mm + Beryllium 1 mm |  |  |
| Power supply | Single phase AC 190 V - 240 V 50/60Hz |  |  |
| Power consumption | STD mode: 3.1 kVA |  |  |
| LOW mode: 2.4 kVA |  |  |
| Generator insulation | SF6 insulation gas |  |  |
| Generator cooling | Anode earth, forced air cooling by radiator |  |  |
| Accessories | Calibration blocks are needed |  |  |
| Computer Data Acquisition System | Required |  |  |
| Operating temperature range | +150C to 400C |  |  |
| Manufacturer | ISO9001 certified |  |  |
| Warranty | 5 year or more |  |  |
| User Guide | Required |  |  |
| **02. Fatigue Testing Machine** | | | |
| Description | To determine the failure of materials when subjected to cyclic stress. The machine should automatically stop when the specimen breaks. |  |  |
| Load | Adjustable dead weight |  |  |
| Cycle rate | Should be displayed and provisions should be provided to control the speed of the motor |  |  |
| Visibility of the experiment | Clear guard should be provided |  |  |
| Electric motor power | 0.35-0.4 kW |  |  |
| motor Maximum speed | 1500 rpm |  |  |
| maximum stress | 350-400 Mpa |  |  |
| maximum cycle count | 9.99X108 with a one resolution |  |  |
| Loading device | Loading device with a load cell (force sensor), range: 0 – 50 Kg. Adjustment using threaded spindle with hand wheel. |  |  |
| safe operation | Metallic protective cages, a fixed one for the motor axis outlet and a removable one for the test piece zone; without it the unit does not work, since it is provided with a safety system to avoid accidents. |  |  |
|  | Automatic shut down in case of the test piece breakage, controlled from the control software (from the computer). |  |  |
| Tools included | Spanner, tommy bar, hexagon tool |  |  |
| Test Specimens | metals |  |  |
| No of specimens | For each material 100 or more no of specimens required for the practicals sessions |  |  |
| other | Motor speed control by a frequency regulator, controlled by the control software (from the computer). |  |  |
| Computer Data Acquisition System | need |  |  |
| Electrical Supply compatibility | 230 V / 50 Hz (Phase voltage) |  |  |
| Operating temperature range | +150C to 400C |  |  |
| User Guide | need |  |  |
| Warranty period | 5 years or more |  |  |
| Manufacturer | ISO9001 certified |  |  |
| Other comments | Electronic display of cycle rate, cycle count and load |  |  |
| **03. Charpy and Izod Impact Testing unit** | | | |
| Description | Determine the energy absorbed at a fracture for metal and non-metal materials |  |  |
| Impact Testing Methods | Charpy and Izod |  |  |
| potential energy | Charpy:- 5J - 25J |  |  |
| Izod:- 5J-20J |  |  |
| Hammer | Charpy:- Hammer has the shape of a “C” and it is used for impact tests on specimens that are supported on both ends. |  |  |
| Izod:- Hammer is used to impact on specimens that are fitted vertically. |  |  |
| Electrical Supply compatibility | 230 V / 50 Hz (Phase voltage) |  |  |
| User Guide | user guide shall have a guidance to conduct each test. |  |  |
| Other comments | Supplied with a set of 20 test specimens or more |  |  |
| Includes digital display of energy absorbed at impact, and angular position before and after impact |  |  |
| Heating and cooling systems to provide specimens at different test temperatures. |  |  |
| Warranty period | 5 years or more |  |  |
| Manufacturer | ISO9001 certified |  |  |
| **04. Hardness Testing Machine** | | | |
| Description | Determine Brinell, Vickers and Rockwell hardness of metallic materials |  |  |
| Materials | Ferrous - steel, casting pieces, etc. Non-Ferrous - aluminum and copper alloys, etc. Ceramic |  |  |
| Maximum test height | 160mm or more |  |  |
| Test Loads | Brinell: 5, 10, 31.25 , 62.5 , 187.5 Kg |  |  |
| Vickers: 3, 5, 10, 30 – 100 Kg |  |  |
| Rockwell: 10, 60 , 100 , 150 Kg |  |  |
| Hardness Reading Range | Brinell: 4 – 450 HB. |  |  |
| Vickers: 14 – 1000 HV30. |  |  |
| Rockwell: 70 – 85 HRA, 20 – 67 HRC and 30 – 100 HRB. |  |  |
| Imprint Measurements | Brinell: imprint reading with microscope. |  |  |
| Vickers: imprint reading with microscope. |  |  |
| Rockwell: optical reading. |  |  |
| Gage Block | Brinell: 200 +/- 50 HB 2.5/187.5/30. |  |  |
| Vickers: 450 +/- 50 HV 30. |  |  |
| Rockwell: 55 – 65 HRC, 25 – 95 HRC and 75 – 95 HRB. |  |  |
| Type of Indenter | Brinell test: balls of 2.5 and 5 mm. |  |  |
| Vickers test: cone made of diamond 136°. |  |  |
| Rockwell test: cone made of diamond 120º and ball of 1/16" (1.588 mm). |  |  |
| Electrical Supply compatibility | 230 V / 50 Hz (Phase voltage) |  |  |
| Required Net Dimension of the equipment | Length 400 mm x Depth 600 mm X Height 900 mm or Similar |  |  |
| Accessories | Calibration blocks are needed |  |  |
| User Guide | This unit is required following manuals: Required Services, Assembly and Installation, Start-up, Safety, Maintenance and Practice Manuals. |  |  |
| Warranty period | 5 years or more |  |  |
| Manufacturer | ISO9001 certified |  |  |
| **05. Travelling Microscope** | | | |
| Travel - Fine  Horizontal 15 mm minimum  Vertical 150 mm minimum  Right angel 10 mm minimum | |  |  |
|  |  |
|  |  |
|  |  |
| Travel – Coarse  Horizontal 150 mm minimum  Vertical 150 mm minimum  Right angel 100 mm minimum | |  |  |
|  |  |
|  |  |
|  |  |
| Base Size (L X B x H ) Minimum 350 mm X 250mm X 80 mm | |  |  |
| Base Plate Cast Iron with three leveling screws | |  |  |
| Objective lens focal length 50mm | |  |  |
| Eye piece 10 x or more with graduated scale | |  |  |
| Least count of all the fine travels 0.01 mm or less | |  |  |
| Telescope tube setting can be set horizontally and vertically | |  |  |
| There should be accessories reading magnifier | |  |  |
| Packing plywood box | |  |  |
| Manufacturer should be accredited for ISO 9001 – 2008 standard | |  |  |
| Product literature of the quoted model should be enclosed , without which the offer is liable  To be rejected | |  |  |
| Supplied product shall have to pass our laboratory test , without which it is liable to be rejected | |  |  |
| Product shall be under minimum 1 year manufacturing warranty | |  |  |

Use separate price schedule for options

Total Price with VAT (in Words): ……………………...…………………………………………………..

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Maintenance charges (as a percentage) after the warranty period (If any): …………………

Vat Registration No: ……………………….

Signature……………………………..

Duly authorized for signed on behalf of ………………………………………………

(Name of the Bidder)

Address…………………………………………………………………………………

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Date………………………………