

**SPECIFICATION FOR
COMBINED BRINELL & ROCKWELL HARDNESS TESTER**

Indent No.:C/4200/7/2634T

Qualifying Criteria

Only those vendors who have supplied and commissioned at least one Combined Brinell & Rockwell hardness tester in the past 10 years in India, and, referred machine is presently working satisfactorily for more than one year after commissioning (on the date of opening of tender) should quote. However, if referred machine(s) has been supplied to BHEL then the m/c should be presently working satisfactorily for more than 6 months after commissioning & acceptance (on the date of opening of tender) in BHEL can also quote.

The following information should be submitted by the vendor about companies where similar equipment have been supplied. This is required from all vendors for qualification of their offer:

- i.) Name of customers/ companies where referred machine is installed
- ii.) Complete postal address of the customers, name & designation of the contact persons of customers with their phone/FAX and e-mail address
- iii.) Month and year of commissioning
- iv.) Type of products tested by the customer
- v.) Parameters of the m/c's supplied, i.e. Brinell loads/ Rockwell Scales etc.
- vi.) Performance certificate from the customers regarding satisfactory performance of the m/c supplied to them (original certificate) or through e-mail directly from the customer of the vendor.
- vii.) BHEL reserves the right to verify the information submitted by the vendor. In case the information is found to be false or incorrect the offer shall be rejected.

Technical Specification

1. The Combined Brinell & Rockwell Hardness Tester shall be used for determining the hardness of metallic materials. The components tested shall range in hardness from annealed copper to surface hardened components.
2. The system should be simple, highly accurate, rugged & easy to maintain. While the measured hardness shall be displayed on a screen automatically after a test, systems involving video cameras are not required.
3. The m/c shall be of the high precision type having a closed loop design & conform completely with the requirements of ASTM E-10 & ASTM E-18. This is to be certified.
4. The test forces/ methods shall be user selectable & be at least:
 - i. For Brinell: 5mm ball /250kgs load, 5mm ball/750kgs load, 10mm ball/1000kgs load, 10mm ball/3000kgs Kgs load
 - ii. For Rockwell: A, B, C scalesAdditional loads/ scales, if available should be detailed.
5. The hardness tester shall be of sufficient rigidity such that there is no rocking or lateral movement of the indenter or the specimen while the load is being applied or removed. Supplier to detail the arrangement for rigid clamping of the specimens during hardness testing.

6. For Brinell Tests:
 - a. The hardness tester shall be equipped with selectable objectives of at least 10x & 20x min. The eyepiece shall have a magnification of 10x min. leading to a total magnification of 100X & 200 X min. Additional objectives, if available should be quoted.
 - b. The impression measuring device for Brinell shall be so constructed that the diameter of the impression can be measured within ± 0.0005 mm or $\pm 0.5\%$, whichever is larger.
 - c. The resolution of the optical system shall be at least 0.1 μ m at 200X.
 - d. The loading duration shall be user selectable between 5-90 secs. Min.
 - e. In case of Brinell testing, measurement of the impression diameter should be measurable on the hardness tester itself. There should be no requirement of removing the component and measuring with a Brinell microscope. The measurement system should basically comprise of an adequately lit screen onto which the impression is projected. The diameter of the impression is measured by movable cross-hairs/arms subsequent to which the data is transferred to the inbuilt processor for direct display of the hardness value
7. The total testing cycle i.e. loading, dwell, unloading shall be fully automatic and shall be executed automatically after selection of a testing programme.
8. The hardness tester shall have a suitable panel with display or output & input of all data & parameters.
9. In case of Rockwell testing, the hardness value should be displayed directly on a screen, subsequent to measurement.
10. The equipment should have an in-built system of conversion of the Brinell/Rockwell hardness values to other scales e.g. Vickers, Brinell, Rockwell etc.
11. The maximum specimen height that can be accommodated on the m/c shall not be less than 500 mm & the maximum specimen depth shall not be less than 200 mm from center.
12. The supplier shall provide a detailed list of tools & accessories i.e. testing table, V anvil, lamps, fuses etc. supplied as a standard.
13. The supplier shall also quote for the following (or their equivalent), if not supplied as a standard:
 - i. Testing table- 200 mm dia. minimum
 - ii. Testing table- 50/60 mm dia.
 - iii. V anvil- 3- 10 mm
 - iv. V anvil- 7-20 mm
 - v. V anvil- 15-50 mm
 - vi. V anvil – 20-60 mm
 - vii. V anvil – 60-150 mm
 - viii. Table with anvil for point support
 - ix. XY stage 100x100 mm, travel 25x25mm, swiveling type
 - x. Certified object micrometer
 - xi. Blind shield
 - xii. Vibration damped platform
 - xiii. Certified Rockwell diamond indenter, complete with holder extension
 - xiv. Certified Rockwell indenter 1/16 inch, 1/8 inch, 1/4 complete with holder extension
 - xv. Certified Brinell indenter with 2.5 mm, 5 mm, 10 mm carbide ball complete with holder extension
 - xvi. Certified Brinell carbide balls of 2.5, 5 & 10 mm
 - xvii. Spare lamps
 - xviii. Clamping devices
 - xix. Printer (not thermal) complete with for data recording
 - xx. Any other spares/ components thought necessary for 5 yrs. trouble free operation

General Terms & Conditions

1. The supplier may quote for more than one model of hardness tester, if desired.
2. Details of the accuracy & uncertainty of the equipment offered, over the total load range/scale of the m/c is to be given.
3. The supplier shall erect & commission the Hardness Tester in our laboratory, demonstrate the performance and accuracy of the main equipment and all its accessories to ensure compliance with complete specifications & parameters quoted by them / as per P.O.
4. The equipment shall work on 220 V \pm 10%, 50 Hz \pm 3% single phase supply.
5. Single point servicing facility of the total equipment with all their accessories & attachments shall be available in India. The address of this service facility with detail of qualification & experience of factory trained engineers in the model of the equipment being offered should be given.
6. The complete equipment & all accessories shall be comprehensively guaranteed for satisfactory performance for a period of 24 months from the date of commissioning and handing over. If any breakdown occurs during this time period then the period under breakdown shall be added to the guarantee period.
7. The supplier shall provide 3 copies of operation and maintenance manuals along with complete circuit diagram of the main equipment and all its accessories.
8. The supplier shall clearly state its repair policy i.e. whether the equipment will be repaired / replaced at the board level or component level. In either case the supplier shall give along with the offer a list of components / boards that he feels that the user should maintain and the cost of each item. For items not on this list, the supplier should indicate that they will be available with him or will have to be imported.
9. The supplier shall give a list of users of similar equipment in India. In each case the model of the hardness tester, their year of commissioning, the detailed name, address, contact number, e mail address of the contact person is to be provided at the first instance.
10. The initial offer as well as subsequent clarifications should be from the OEM only. All the points given above should be individually addressed and all supporting documents provided at the first instance to avoid repeated queries. It shall be preferable if an exhaustive technical presentation is made available in a CD for better understanding of the features