

NEWAGE® 9000N Series Automatic Brinell Testing System

Specification Sheet
SS-AB9000-0310
March 2010

The NEWAGE® 9000N Series makes a Brinell impression in conformance with the standard method for Brinell testing as described in ASTM E-10. The impression made with the 9000N Series is measured based on the the depth of the indentation as described in ASTM E-103. This technique offers higher productivity, faster testing and reduced operator influence.

Like the Rockwell hardness method, the depth measurement used by the 9000N Series is calculated based on the difference in penetration depth between the preload (minor load) and the major load position. During a test sequence, the 9000N Series applies a preload, zeroes the measurement, applies a full load, returns to the preload setting, and calculates the depth measurement. An LVDT is used to measure the depth while a precision load cell is used to accurately and precisely apply the loads.

For a given material, the depth measurement has been established to be linear to the width of the indention, however this relationship may change due to material characteristics such as elastic recovery. Also, the ridge that is created and that forms around the impression may be higher on some materials, thus the width may vary. In order to compensate for this conditions, the 9000N Series may be programmed to adjust its readout so that the measurement accurately reflects the linear relationship of width and depth. The compensation is determined by "benchmarking" the impression by first using an optical measurement and comparing the measurement to the 9000N Series displayed result.

The 9000N Series is comprised of a load frame, precision load cell sensor, LVDT for deflection measurement, hydraulic actuation system and our advanced electronics console. The 9000N Series performs all testing in the HB30 scale with a 10mm carbide ball and a 3000 kgf major load.

Features

- Meets ASTM E-10 and E-103
- Easy-to-use and Comprehensive Display Console
- Hi/Lo Tolerance Settings
- Adjustable Time @ Load
- Test Result Memory for up to 5000 results
- Split Memory
- RS232 Output
- Print and Display Statistics
 - Average
 - Range
 - Min/Max
 - Standard Deviation
 - CPk
- Sequence Numbering
- Lot Numbering

Specifications

Operation:	Hydraulic
Load Measurement:	Load Cell Sensor
Load Selection (kgf):	3000, 1500, 500
Time-at-Load (sec):	0 - 99
Vertical Capacities	
with Elevating Screw:	8" to 28"
without Elevating Screw:	16" to 36"
Indenter Stroke:	4" to 24"
Indenter:	10mm Tungsten Carbide
Scale:	HB30
Operating Temp:	50°F to 120°F 10°C to 49°C
Warranty:	1 year



Shown: 9000N Series without hydraulic power system.

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ASTM E-103 Conformance

The 9000N Series conform to ASTM E-103.

Electronics Consoles

The 9000 Series features our advanced electronics console. The LED display displays prompts that guide you through the setup process. The display also indicates the result, scale, and SPC results. The advanced keypad has a numeric keypad, function keypad and scale select keypad. Function keys include MODE (set/view timed load, minimum thickness calculation and automatic averaging); STAT (view statistics, clear results, view/change sequence number, view/change lot number, split memory); TOL (view/change HI/LO tolerance setpoints); CAL (calculate/clear hardness, calculate/clear displacement); ZERO SET (round correction); CONV (convert hardness results to different scale); ENTER (enter values into memory).

Secure Access

The 9000N Series uses a security code that prevents unauthorized users from making changes to the tester's setup.

Hi/Lo Tolerance Setup

You may setup HIGH and LOW tolerance limits for your hardness results. Once you test is complete and the console displays the result, the result will be displayed with a HI when the measured result exceed the HI tolerance limit; with a LO when the measured result exceeds the LO tolerance limit; or an OK when the measured result is within the tolerance limits established.

Adjustable Time @ Load

The MODE function key on the advanced console used on the 9000N Series is used to select the time at load. Time at load options are from 1 thru 99 seconds.

Minimum Thickness Calculation

This is another feature available with the advanced console electronics found on the 9000N Series. When invoked, the 9000N Series console will display the minimum thickness value for the last test. The thickness value is displayed with the associated hardness scale and may be represented in IN (inch) or MM (millimeter) units. Press the YES key to toggle between units.

Calculation Function

The 9000N Series has six different calculations available that are controlled using the CAL key: calculate hardness, calculate displacement, clear hardness, clear displacement, A/D factor, and for Factory Set.

The calculate hardness function is similar to a mechanical adjustment conforming to ASTM E-18. The limit of the adjustment range is ± 0.5 pt. You can adjust the hardness readout.

The other functions are all factory set and cannot be changed.

Statistic Outputs

The 9000 Series can be setup to display statistics on your test results. When statistics are invoked, the display will indicate the mean and standard deviation (uses [n-1] method).

The 9000N Series lets you print out statistics including mean, range, min/max, standard deviation, and CPK values. Histograms of your results may also be printed.

Result Averaging

Automatic averaging of your results can be setup on the 9000N Series electronic console. You may request averaging on from 2 to 10 results. The console will display the average of your results. When printing out the results, the printout would show each result value for as many tests as you request to be averaged (up to 10). Plus, the print out will show the range, average and *H symbol next to the highest result in the range and *L next to the lowest result in the range. When averaging is used the average is saved in memory and not the individual test results for the range.

Save Results to Memory

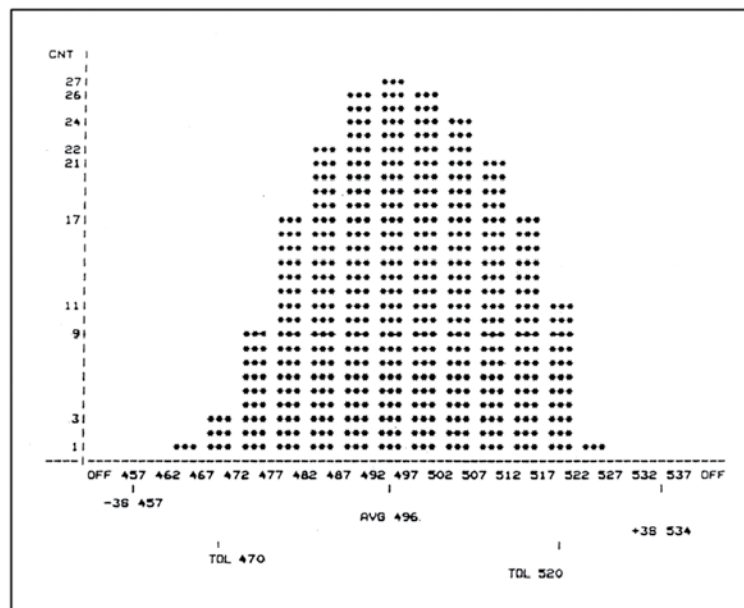
Up to 5000 results may be saved in memory.

Split Memory

The 9000N Series lets you store data from different parts in unique file or scale locations so that SPC can be performed on "like results" from the same scale. You can create up to 30 different files for independent data analysis on each file. For example, multiple

LOT #	102687930	SEQ #	64	Z-DSP	100.0	CAL		LOWTOL	63.0	HIGHTOL	64.0						
TOT	64	GOOD	43-67%	LOW	3-5%	HIGH	18-28%	MIN	62.5	MAX	65.4	CPK	.09	ZCALCMIN	1.136	ZCALCMAX	.275
RANGE	2.9	AVG	63.80	VAR	.501	STD DV (N-1)	.707	STD DEV (N)	.702	PRED * OUT LOW (Z-TABLE MIN)	12.71	PRED * OUT HIGH (Z-TABLE MAX)	39.19				
Z TABLE VALUES GREATER THAN .5%																	

Shown: totals printer output format.



Shown: Histogram printout- Values on X axis are Rockwell values; decimal places are omitted to make room for more cells.

Brinell files can be created and named, e.g. HB1, HB2, etc. Each file can be setup to have its own tolerance and evaluated independent of other files.

RS232 Output

The RS232 output on the 9000N Series can be used to print histograms or interface with a personal computer with our DataView™ application software for advanced data management and analysis.

The 9000N Series can be configured to print totals, graphs, history, results/values only, and optionally X-bar and R charts.

Totals

When totals is configured, the 9000N Series will print SPC values for the hardness result in memory. This includes number of tests, min/max, average and standard deviation. Tolerances must be used when printing totals.

Graph

When the graphing feature is enabled, the 9000 Series will print a histogram showing the results for a certain lot grouped in ranges with the indication of the number of results in each range. The ranges are automatically scaled and include spc limits, control limits and mean. Tolerances must be used when printing a graph.

History

When print history is invoked, the 9000N Series will print a header, lot number sequence, zero set number, calibration status, HI and LO tolerance settings. The operator may select the number of tests that history is required for. Each test will display the test result and hardness scale and the associated tolerance status (HI, LO, OK) for each result.

Results/Values

When the results print option is selected, the results of each test is printed automatically after the completion of a test. The result value, lot number, sequence number, zero displacement and tolerances are included.

When the value print option is selected, the test result value only is printed.

Sequence Numbering

Sequence numbering can be used to further identify individual test results within a group or series of tests. Each item a test is performed, a unique sequence number is applied to that result. Up to 65,335 sequence numbers are available. The sequence number is appended to the test result on printouts. Sequence numbering is available on the 400 Series only.

Lot Numbering

Using the 400 Series console, the user may specify a lot number that is assigned to a specific set of test results for further identification. When selected, the lot number accompanies the results on your printout.

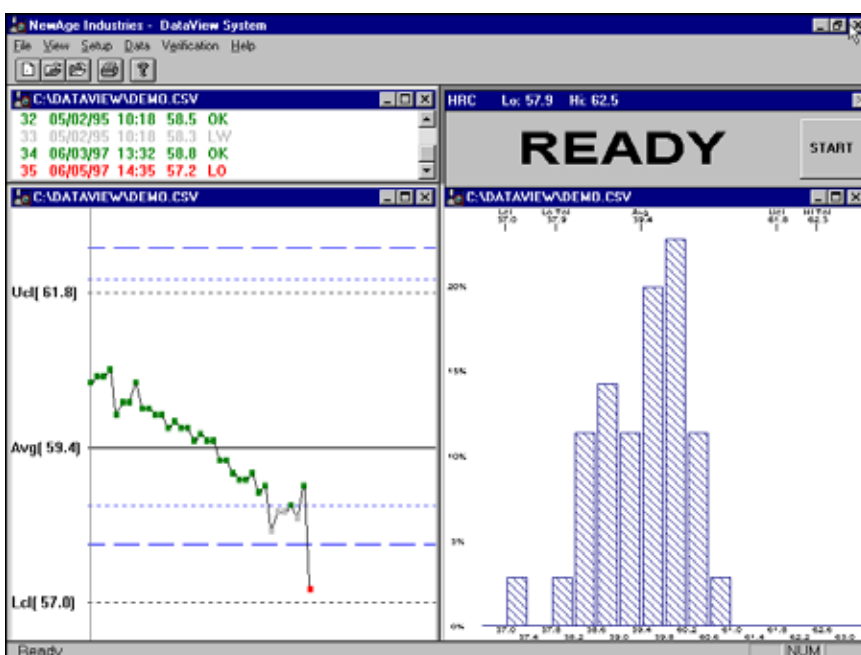
Test Surface Referencing

The 9000N Series employs test surface referencing that helps compensate for errors resulting from specimen deflection.

Surrounding the indenter is a shroud. The shroud senses the indenter position relative to the test surface when the preload is applied. Should the test specimen deflect under major load, the shroud travels with the test surface to compensate by maintaining that precise reference position. Errors due to vibration or dirty environments can be eliminated.



Shown: Indenter with shroud assembly. The indenter is a 10mm tungsten carbide ball welded to a threaded shaft.



Shown: With the optional DATAVIEW software, users have a variety of analysis and data management tools available.

Ordering

9000 Series

Model	Description
9000N	Standard Digital Bench Brinell (Base Unit only)

Accessories and Options

Part No.	Description
81HE-08C	Indenter, 10mm tungsten carbide
81HE-10C	Penetrator shroud assembly, with swivel mount
81HE-35	Washer, for nosepiece penetrator shroud, plastic
AT/5510	Light, flexibler arm test point for illumination
9120	Bench cabinet, metal, for tester only
35-450	Pocket Brinell scope, 20X, fixed focus with carrying case
5620-01	HiLight Brinell scope, 20X, adjustable focus with carrying case, 0.1mm resolution (special order)
5620-05	HiLight Brinell scope, 20X, adjustable focus with carrying case, 0.5mm resolution



The NEWAGE® 5620 Series HiLight Brinell Scopes features a high-efficiency LED array for its light source, providing excellent illumination and improved readability over conventional “flash light” scopes. The LED array consists of four individual LEDs positioned to provide an even and consistent definition of the Brinell impression’s edge. The 5620 Series uses a 3V lithium CR2 battery. Up to 200 hours of continuous use is typical before a battery change is required. An optional motion sensor/timer can be used to automatically turn the scope On/Off.

AMETEK

MEASUREMENT & CALIBRATION TECHNOLOGIES

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