

# TELEWELD INC.

**STROUD SYSTEMS, INC.**  
600 NORTH SHEPHERD DR., SUITE 115  
HOUSTON, TX 77007  
(713) 861-3270

## TESTING NON-STEEL MATERIALS WITH THE TELEBRINELLER

Standard TELEBRINELLER test bars are made of rolled carbon steel and carbon steel alloys. These bars are most suitable for testing similar materials.

When these standard test bars are used for testing other materials such as cast iron, aluminum, brass, stainless steel etc., impact errors usually occur. The impact error for a given material is constant and can be determined in the following manner.

Using a sample of the material to be tested, determine its hardness on a standard brinell machine. The load should be such that an impression with a diameter of 2.5 to 4.0 mm. is obtained. On this same material, make a hardness test with the TELEBRINELLER using a standard bar within 20 BHN points of the material being tested.

On low ductile materials, the TELEBRINELLER test will usually show a lower hardness than the standard brinell machine. As an example, on a certain type of aluminum the TELEBRINELLER may show a hardness of 120 BHN while the standard machine will show 132 BHN. Thus there is an impact error of 10% and all readings obtained with the TELEBRINELLER on this material can be multiplied by 1.1 to obtain the actual hardness.

If the TELEBRINELLER user desires the most accurate results on materials with an impact error, the only solution is to fabricate test bars from the same material that is to be tested. This is costly and time consuming although we do have a limited assortment of aluminum test bars available from stock.

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## TELEBRINELLER ACCURACY

Standard Telebrineller Test Bars are guaranteed to have a uniform hardness within plus or minus 3% of the BHN etched on the end of the bar. They are made of various alloys of carbon steel and finish ground to 9/16" square.

To calibrate, three impressions are made in each bar with an Antonik Model HB-3000B Tester with accuracy certified traceable to the National Institute of Standards. For bars harder than about 207 BHN, a 3000 kg. load is used while softer bars are impressed at 1500 kg. A 10 mm dia., Tungsten Carbide ball is used in both cases.

The diameters of the impressions are then measured and converted to Brinell Hardness Numbers using a King-Scan, computerized, calibration system, the accuracy of which is checked regularly against a set of standards certified traceable to the National Institute of Standards. The resulting Brinell Hardness Numbers are rounded to the nearest standard BHN occurring at a .05 mm interval in Table I of ASTM Standard E10 and this BHN is etched on the end of the bar.

Please note that the accuracy of any test made with the Telebrineller is dependent upon the relative hardnesses of the test bar and the test piece. When the Telebrineller is properly used, accuracy of  $\pm 5\%$  is consistently attainable, provided that the BHN of the test bar does not differ from the BHN of the test piece by more than 15%.

## TELEBRINELLER TEST BAR AVAILABILITY

Sometimes it is impossible for us to supply a customer with bars of a specific Brinell Hardness in a timely manner. We hope that an explanation of the manufacturing process for Telebrineller Bars may help you understand how this problem can occur.

During the course of a year, we process between 15,000 and 20,000 Telebrineller Bars calibrated to 60 different hardnesses between 103 BHN and 601 BHN. They are fabricated from a wide assortment of carbon steel bar stocks used in the as-rolled condition or subjected to various heat treating procedures. They are typically processed in batches of 300 to 400 pieces and the bars yielded from each batch are carefully documented.

When, as an example, we find ourselves running out of 223 BHN Bars, we review our records to determine what materials and processes have yielded 223 BHN in the past. We then begin to process one or several batches of these materials.

It is very important, however, to understand that producing a piece of steel to a specific hardness is not like producing one to a specified size. Sizing can be done with great precision but, because of variations from batch to batch in steel chemistry, mill work hardening, and heat treating results, hardness can only be approximated.

A material and process, that yielded a good percentage of 223 BHN Bars from a previous run, may produce only 229 and 235 BHN the next time. Though we do take samples, during the processing of each batch, to give us an indication of the potential yield, we cannot know the actual results until all the bars in the batch are calibrated. There is, therefore, always a measure of luck involved in acquiring bars of a specific BHN and sometimes, when luck runs against us, it may require several months before we can rebuild that stock.

However, such a shortage in our inventory should not usually be a serious problem for our customers. In most cases, when our stock of a specific Bar is depleted, we will be able to supply the next standard BHN above or below it.

A given Telebrineller Bar can be used to test material 15% harder or softer than the bar with no loss of accuracy. Returning to our example, a 223 BHN Bar is, therefore, suitable for testing materials between 190 and 256 BHN. If, however, 223 BHN Bars are not available and we offered 229 BHN instead, the suitable testing range would be from 195 BHN to 263 BHN. Since there is an 84% overlap in the usable range of these two Bars, it is apparent that they can usually be interchanged with no inconvenience. The same would hold true for any Bars of sequential BHN throughout the Brinell range.

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## TELEBRINELLER TEST BARS

Following is the list of Brinell Hardness Numbers (BHN) to which Telebrineller bars are calibrated.

At any given time our inventory will contain most of the hardnesses listed, but, if you have a very specific requirement, it is recommended that you check with us concerning its availability.

627	363	235	151
601	352	229	147
578	341	223	142
555	331	217	138
534	321	212	135
514	311	207	131
495	302	200	127
477	293	194	124
461	285	188	121
444	277	182	117
429	269	176	114
415	262	170	111
401	255	165	109
388	248	160	106
375	241	156	103