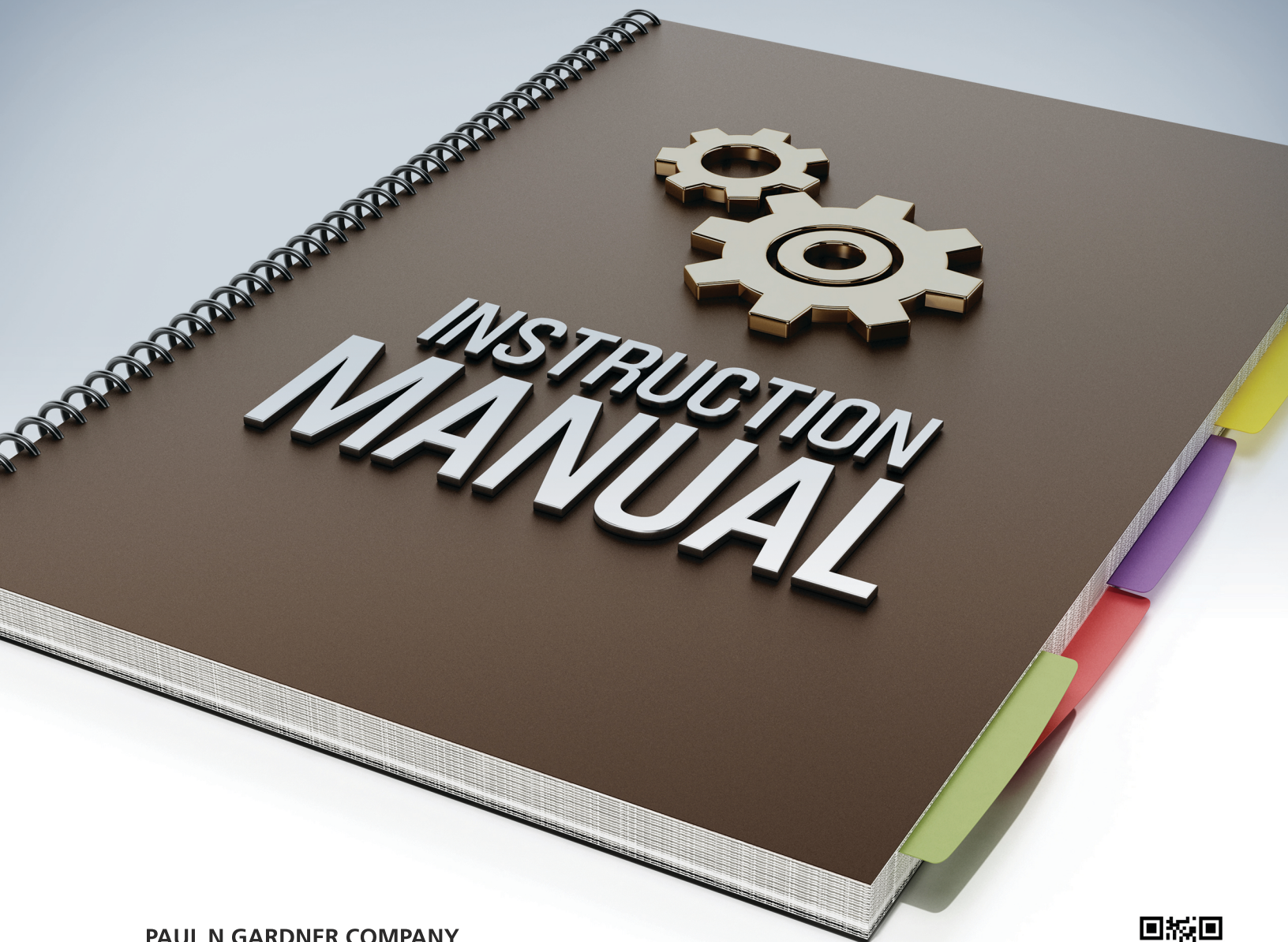




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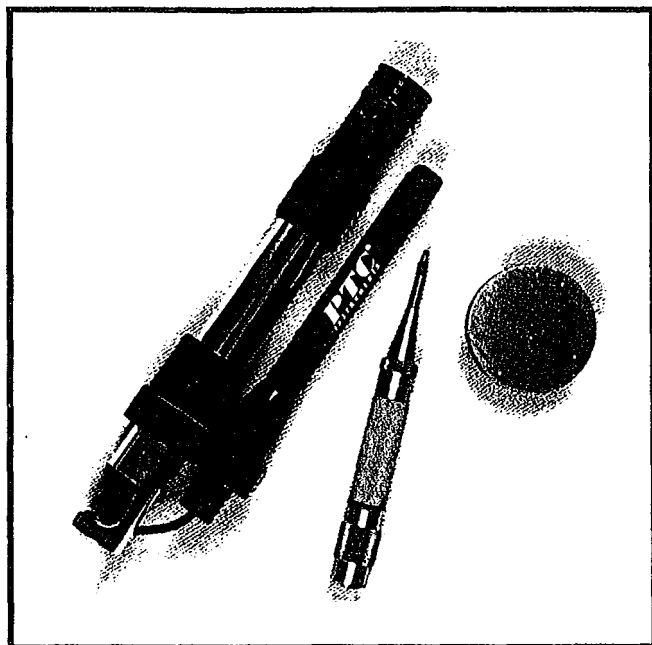
INSTRUCTIONS

GARDCO DISTRIBUTED PRODUCTS



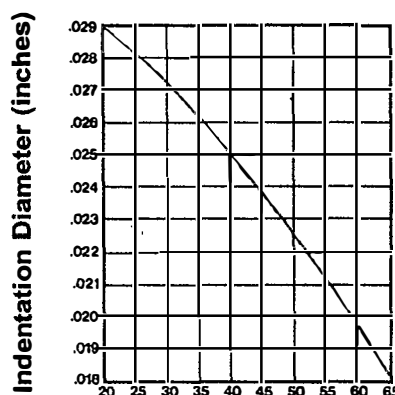
Portable Steel Hardness Tester

Model 316 Equivalent Rockwell C Scale



Model 316 shown above

- **Completely Portable Steel Hardness Tester**
- **Range of 20 to 65 HRC (equivalent Rockwell C Scale)**
- **Accuracy of ± 1.5 Points**



Equivalent Rockwell C Scale

CALIBRATION CURVE FOR MODEL 316

SPECIFICATIONS

1. Range...20 to 65 HRC (equiv. Rockwell C Scale).
2. Accuracy..... ± 1.5 points.
3. Dimensions of Carrying Case:
 - Length..... 9-1/2 in. (24.1 cm).
 - Width..... 6-1/2 in. (16.5 cm).
 - Depth..... 2-1/2 in. (6.4 cm).
4. Dimensions of Microscope
 - Length..... 7-1.2 in. (19.1 cm).
 - Base Diameter..... 7/8 in. (2.2 cm).
5. Microscope Illuminator..... two AAA batteries.
6. Weight 2 lb. (0.9 kg).
7. Shipping weight 4 lb. (1.8 kg).

The illumination system is a Mini Maglite® coupled to a fiber optic light pipe. The flashlight is powered by two AAA batteries. A spare bulb is located in the tail cap of the flashlight. Note: we do not recommend using Duracell® batteries in the flashlight due to their larger diameter.

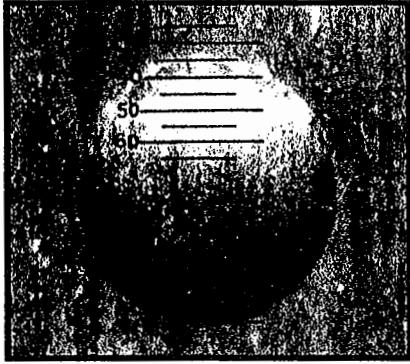
The Model 316 Portable Steel Hardness Tester measures hardness in the range of 20 to 65 HRC (equivalent Rockwell C Scale) with an accuracy of ± 1.5 points.

A hand-held impact indenter drives a 1/16" diameter carbide ball into the sample with a calibrated impact. The impression diameter is read directly with a microscope containing a calibrated reticle.

Certification of the calibrated test block in accordance with ASTM E18 (Section 20) is available upon request for a nominal fee. See current price list for cost.

PTC's Model 316 includes a hand-held impact indenter, an illuminated 60X measuring microscope, batteries, test block, hardness conversion calculator, instructions, and carrying case.

MODEL 316 INSTRUCTIONS



Unretouched photomicrograph, showing the microscope reticle in position over an indentation. This measurement indicates a value of 33HRC on the equivalent Rockwell C Scale.

SPARE PARTS LIST

Part No.	Description
316.2.....	Indenter complete
316.22.....	Indenter Tip only
316.29H	Test Block—(50 thru 65 HRC)
316.29L	Test Block—(40 thru 49 HRC)
316.29S	Test Block—(30 thru 39 HRC)
655C	Conversion Calculator
316.8.....	Mini Maglite® with fiber optic light pipe
LM3A001	Replacement Lamp (pack of 2)

GUARANTEE & CALIBRATION SERVICE

Pacific Transducer Corp. guarantees the workmanship and materials of these instruments for one year from the date of purchase.

PTC® offers a free calibration check service on these instruments. This offer covers only a calibration check and should not be construed as replacement of parts or repairs. Return postage required.

OPERATING INSTRUCTIONS

Prepare the sample by cleaning the surface with a piece of emery paper or steel wool. The sample should be at least as smooth as can be obtained using size 400-A emery paper. The sample, if small, must be placed on a heavy, smooth, hard surface when the indentation is made. This is to overcome a lack of mass in thin sections.

Sheet metals to be measured should be at least 0.020" (0.5 mm) thick. A smooth, hard metal surface must back up the sample. If the sample and the backing plate are not in contact, an erroneous reading will result.

Hold the indenter in the hand at right angles to the surface of the sample. Slowly force the tip into the sample until the indenter trips. A clean, smooth, shallow cavity will result.

Twist the barrel of the flashlight until the light comes on so that the base is illuminated. Place the microscope over the sample so that the hole in the microscope base is over the indentation. Center the indentation in the sight so that the reticle is tangential to the indentation (see photo).

The hardness may now be obtained by measuring the diameter of the indentation with the scale in the microscope. The values are in equivalent Rockwell C Scale. Several measurements should be made as the sample being tested may have soft or hard spots.

INSTRUMENT CHECK

A marked and calibrated steel test block is provided for checking the accuracy of this instrument. **IMPORTANT:** When making this check, place the test block on a smooth, flat, heavy, and rigid metal surface. Do not read the factory made diamond indentation which was done to calibrate the test block. Indentations made with the Model 316 indenter are smooth and round; as opposed to the sharper, more conical shaped indentation made from diamond indenters. Per ASTM E-18, only the test block surface with the PTC® mark should be used, this surface must not be re-worked. Tests must not be made any closer than three diameters, as previous indentations distort the hardness of the surrounding area.

Make several tests of the test block. If the measurement of the test block does not check with the microscope, the instrument should be returned to the factory for recalibration.

Rockwell 'B' & 'C' Scale Conversion Calculators



Made In U.S.A.



Model 655C Conversion Calculator
for Rockwell 'C' Scale shown above

- **Easy to Use and Read Circular Charts**
- **Versions for Rockwell 'B' & 'C' Scales**
- **Values Based on ASTM A-370**
- **The Perfect Accessory for Any Hardness Tester**
- **Features All of the Most Common Scales**

The Model 655B Conversion Calculator is based on the Rockwell B Scale and includes the following scales: Rockwell A, B, F, and K; Brinell (10 m) 3000 kgf and 500 kgf; Tensile Strength; Rockwell 15T, 30T, 45T; Knoop; and Vickers.

The Model 655C is based on the Rockwell C Scale and includes: Rockwell A, C, and D; Tensile Strength, Brinell Standard Ball and Carbide Ball; Knoop; Vickers; Rockwell 15N, 30N, and 45N; and Scleroscope.

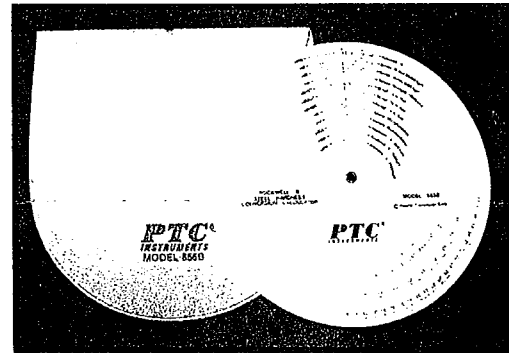
The conversion values of this calculator are consistent with ASTM A-370.

When the radial is set on any designated value for any one scale, it indicates the equivalent value on all the others. The calculator is 6 inches in O.D. and the two rotating plastic disks used for each calculator are 0.02 inch thick.

The Hardness-Tensile Strength relations may vary according to the processing history or to the chemical composition of the steel. The Models 655B & 655C are intended for use with nonaustenitic steel and ferritic¹ or martensitic¹ stainless steels. They should not be relied for austenitic² steels, nickel, or high-nickel alloys.

1) 400 Series Stainless Steels.

2) 300 Series Stainless Steels.



Model 655B Conversion Calculator
for Rockwell 'B' Scale shown above

GUARANTEE & CALIBRATION SERVICE

Pacific Transducer Corp. guarantees the workmanship and materials of these instruments for one year from the date of purchase.

PTC® offers a calibration check for PTC® brand instruments. This covers only a calibration check and does not include adjustments, repairs, or replacement of parts. Shipping charges are the responsibility of the customer.

Approximate Hardness Conversion Numbers for Non-austenitic Steels (Rockwell C to other hardnesses)

Rockwell C Scale, 150kgf Load, Diamond Penetrator	Vickers Hardness Number	Brinell Hardness 3000kgf Load 10mm Ball	Knoop Hardness, 500kgf Load and Over	Rockwell A Scale, 60kgf Load, Diamond Penetrator	Rockwell Superficial Hardness			Approximate Tensile Strength ksi
					15N Scale 15kgf Load Diamond Penetrator	30N Scale 30kgf Load Diamond Penetrator	45N Scale, 45kgf Load, Diamond Penetrator	
68	940	-	920	85.6	93.2	84.4	75.4	-
67	900	-	895	85.0	92.9	83.6	74.2	-
66	865	-	870	84.5	92.5	82.8	73.3	-
65	832	739	846	83.9	92.2	81.9	72.0	-
64	800	722	822	83.4	91.8	81.1	71.0	-
63	772	706	799	82.8	91.4	80.1	69.9	-
62	746	688	776	82.3	91.1	79.3	68.8	-
61	720	670	754	81.8	90.7	78.4	67.7	-
60	697	654	732	81.2	90.2	77.5	66.6	-
59	674	634	710	80.7	89.8	76.6	65.5	351
58	653	615	690	80.1	89.3	75.7	64.3	338
57	633	595	670	79.6	88.9	74.8	63.2	325
56	613	577	650	79.0	88.3	73.9	62.0	313
55	595	560	630	78.5	87.9	73.0	60.9	301
54	577	543	612	78.0	87.4	72.0	59.8	292
53	560	525	594	77.4	86.9	71.2	58.6	283
52	544	512	576	76.8	86.4	70.2	57.4	273
51	528	496	558	76.3	85.9	69.4	56.1	264
50	513	482	542	75.9	85.5	68.5	55.0	255
49	498	468	526	75.2	85.0	67.6	53.8	246
48	484	455	510	74.7	84.5	66.7	52.5	238
47	471	442	495	74.1	83.9	65.8	51.4	229
46	458	432	480	73.6	83.5	64.8	50.3	221
45	446	421	466	73.1	83.0	64.0	49.0	215
44	434	409	452	72.5	82.5	63.1	47.8	208
43	423	400	438	72.0	82.0	62.2	46.7	201
42	412	390	426	71.5	81.5	61.3	45.5	194
41	402	381	414	70.9	80.9	60.4	44.3	188
40	392	371	402	70.4	80.4	59.5	43.1	182
39	382	362	391	69.9	79.9	58.6	41.9	177
38	372	353	380	69.4	79.4	57.7	40.8	171
37	363	344	370	68.9	78.8	56.8	39.6	166
36	354	336	360	68.4	78.3	55.9	38.4	161
35	345	327	351	67.9	77.7	55.0	37.2	156
34	336	319	342	67.4	77.2	54.2	36.1	152
33	327	311	334	66.8	76.6	53.3	34.9	149
32	318	301	326	66.3	76.1	52.1	33.7	146
31	310	294	318	65.8	75.6	51.3	32.5	141
30	302	286	311	65.3	75.0	50.4	31.3	138
29	294	279	304	64.6	74.5	49.5	30.1	135
28	286	271	297	64.3	73.9	48.6	28.9	131
27	279	264	290	63.8	73.3	47.7	27.8	128
26	272	258	284	63.3	72.8	46.8	26.7	125
25	266	253	278	62.8	72.2	45.9	25.5	123
24	260	247	272	62.4	71.6	45.0	24.3	119
23	254	243	266	62.0	71.0	44.0	23.1	117
22	248	237	261	61.5	70.5	43.2	22.0	115
21	243	231	256	61.0	69.9	42.3	20.7	112
20	238	226	251	60.5	69.4	41.5	19.6	110

This table is based on ASTM A370 Table 2A. This table gives the approximate interrelationships of hardness values and approximate tensile strength of steels. It is possible that steels of various compositions and processing histories will deviate in hardness-tensile strength relationship from the data presented in this tables. The data in this table should not be used for austenitic stainless steels, but have been shown to be applicable for ferritic and martensitic stainless steel. Where more precise conversions are required, they should be developed specially for each steel composition, heat treatment, and part.