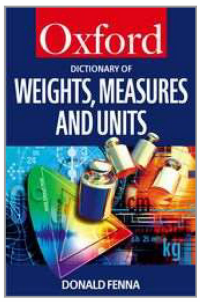
The *Oxford Biblical Studies Online* and *Oxford Islamic Studies Online* have retired. Content you previously purchased on *Oxf* *Biblical Studies Online* or *Oxford Islamic Studies Online* has now moved to *Oxford Reference*, *Oxford Handbooks Online*, *Oxford Scholarship Online*, or *What Everyone Needs to Know*®. For information on how to continue to view articles visit the subscriber services page. Dismiss



A Dictionary of Weights, Measures, and Units
Donald Fenna

Publisher: Oxford University Press
Print ISBN-13: 9780198605225
Current Online Version: 2004
Print Publication Date: 2002
Published online: 2004
eISBN: 9780191726910

hardness numbers

engineering. The pioneer scale for hardness of solids was the **Mohs** scale of 1824, using ten natural minerals as the comparators. Elaborated in 1933 to the fifteen-point **Ridgeway** or **modified Mohs** scale, it is shown, with values of the Knoop scale, in Table 22. For further values see any edition of *C. R. C. Handbook of Chemistry and Physics* (Cleveland, OH: C. R. C. Press)

Table 22

Mohs	Ridgeway	Material	Knoop
1	1	talc	
2	2	gypsum	32
3	3	calcite	135
4	4	fluorite	163
5	5	apatite	430
		glass	530
6	6	feldspar	560
	7	vitreous pure silica	
7	8	quartz	820
	9	garnet	1 360
8	10	topaz	1 340
9		corundum	1 800
	11	fused zirconia	2 100
	12	fused alumina	
	13	silicon carbide	2 480
	14	boron carbide	2 750

	14	boron carbide	2 750
10	15	diamond	7 000

For metals, scleroscopic tests using indentation with a controlled blow or pressure are normal. Tabor D. *The Hardness of Metals* (Oxford: Clarendon Press, 1951) They were pioneered by the **Brinell** scale of 1900; this uses a standardized indenter ball of 1 cm or other specified diameter pressed against the surface,See ASTM E10-66 for specifications with the Brinell hardness number being the ratio of the force used to the curved surface area of the resulting indentation (preferably sufficient to make the indentation 25 to 50% the diameter of the ball, and generally expressed as kilogram-force per square millimetre). The **Meyer** scale is similar, giving slightly larger numbers, depending on ball size; the **Vickers** (called also **diamond hardness dynamic test**) of 1922 and the **Knoop** scale of 1939 use pyramidal diamond indenters. The former, regarded as very accurate for a wide range of thickness in the tested material, uses a square point, the latter a rectangular point, particularly useful for very thin or plated materials.

The **Rockwell** scales of 1922 use a ball or a pointed indenter, but with depth of indent being salient. It uses a range of set cones for different sectors of hardness, these being labelled with letters that must be appended to the penetration reading. A load of 1 kg is applied throughout the test, setting the zero datum before the test load is applied.

In the **Shore** (also **scleroscope hardness**) scale, a light-weight ball hammer is dropped from 25 cm and its proportion of bounce off the horizontal surface is measured on an equi-spaced scale of 140 units running from 0% to 100% of the drop.

Select approximate comparisons are shown in Table 23 (with WC = tungsten carbide). See latest *Machinery's Handbook* (New York: Industrial Press, 2000 or later) for more

Table 23

name:			**Rockwell**		**Vickers**	**Brinell**	**Shore**		
scale:	**C**	**A**	**D**	**superficial**					
load:		**60 kg-f**	**100 kg-f**						
penetrator:						**stnd**	**WC**		
	68	85.6	76.9	93.2	75.4	940			97
	60	81.2	70.7	90.2	66.6	697		654	81
	52	76.8	64.6	86.4	57.4	544	500	512	69
	44	72.5	58.5	82.5	47.8	434	409	409	58
	36	68.4	52.3	78.3	38.4	354	336	336	49
	28	64.3	46.1	73.9	28.9	286	271	271	41

name:			Rockwell		Vickers	Brinell	Shore		
	20	60.5	40.1	69.4	19.6	238	226	226	34
		160	152	152					24