

SHARPNESS CHART

Sharpness is determined by the edge radius at its apex.

The chart uses three units of measurement:

Micron – edge apex thickness in microns: 1 micron (μ) = 0.001 millimetre (mm), or 1000 nanometres (nm), or 10,000 angstroms.

BESS - an acronym for "**Brubacher Edge Sharpness Scale**". BESS-calibrated edge sharpness testers show edge apex radius in nanometres, e.g. Gillette DE shaving razors score 50 on the tester and have 50 nm apex radius, i.e. 100 nm or 0.1 micron edge apex thickness.*

REST – an acronym for CATRA "**Razor Edge Sharpness Tester**", push-cutting force in Newton.

The apex thickness values given for the "Conventional sharpness tests" are the least sharp edge that can perform the test cleanly (i.e. the earliest sharpness from the dull end).

Knife community uses a set of fanciful terms to describe sharpness: "nuts, scary, crazy, wickedly sharp" etc – in this chart we put them in order by the edge apex thickness.

CLASSIFICATION OF SHARPNESS

Description	edge apex thickness		
	Micron	BESS	REST
Dull The edge reflects visible light.	> 1	> 500	> 5N
Working edge Fingernail test positive. Slices print paper and newspaper.	0.6-0.8	300-400	3-4N
Sharp E.g. quality cutlery out of the box. Slices a sales docket.	~ 0.5	250-300	2-3N
Very sharp E.g. utility knife blade (new). The edge doesn't reflect visible light.	0.3-0.4	150-200	1.4-1.8N
Shaving sharp (see all gradations below) Whittles soft wood.	0.3	160	1.5N
Wickedly sharp Edges less than thickness of a human hair cuticle of 0.3 micron; shaves against the skin.	< 0.3	< 150	
Nuts sharp Filleting/shaving print paper.	0.2-0.3	100-150	
Scary sharp Cuts cigarette rolling paper vertically. Hair violin sign.	0.2	100-110	< 1N
Crazy sharp	< 0.2	< 90	
Insane sharp Cuts a free hanging hair.	0.1-0.15	50-80	0.5-0.6N
Razor sharp Sharpness of the DE shaving razor Gillette. Splits hair.	<= 0.1	<= 50	0.3-0.4N
Sharper than razor Sharpness of the DE shaving razor Feather. Whittles hair. Cuts cigarette rolling paper horizontally.	~ 0.05	<= 30	<= 0.2N

SHAVING SHARP GRADATIONS

- scraping shaving Hairs are ripped rather than cut, the epidermis is scraped, sometimes "blood dew".	0.3	160	1.5N
- shave forearm with the grain of hair	0.25	140	1.3N
- shave forearm against the hair grain	0.2	100	1N
- shave forearm close to the skin; smooth face shaving	≤ 0.1	30-50	0.3-0.4N
- tree topping You can run the edge down above the skin and cut free standing hairs in the middle.	~ 0.05	25-30	$< 0.3N$

CONVENTIONAL SHARPNESS TESTS

Thumb Pad Test - draw your moistened thumb across, not along, the edge to feel how it grips into your thumb print.

If the edge tickles your thumb the knife is not dead dull. This is a widespread belief; our tests, however, show that this test can be positive even with a grossly dull knife.

Too subjective to be a useful test; not recommended for use.

Fingernail Test - resting the edge with its own weight under an angle on your nail, check if it catches. When it sticks, it is sharp. If the edge glides over your nail, it is dull.

The fingernail test becomes positive at 350 BESS or about 0.7 micron edge.

This one is a truly useful test as it tells you have a **working edge**.



Whittles soft wood (e.g. pine) – becomes positive at 150 BESS or 0.3 micron edge.

This is shaving range, which has a number of well-defined gradations described earlier.

PAPER TESTS

Roughens & tears paper – a knife starts tearing paper at 600 BESS or about 1 micron edge, not duller.

Obviously, such a knife requires sharpening.

Slices 80gsm print paper – a knife can do it starting with 450 BESS or 0.9 micron edge, which is the upper limit of the working edge.

Not a very clean cut initially; the sharper the edge the cleaner the cut.

Slices newsprint (the density varies by newspaper, approx. 50-60gsm) – this is somewhat more demanding, and indicates an edge within a good working range, at minimum 400 BESS or 0.8 micron edge.

Slices a sales docket/receipt (approx. 50gsm) – as the thermal paper is both thin and dense, this test is even more demanding for sharpness, and becomes positive at 300 BESS or about 0.5-0.6 micron edge.

When positive, this test takes the edge from just working to **sharp**.

Filleting print paper, i.e. shaving off layers of 80gsm paper not cutting through.

An edge is able to fillet paper at 130 BESS or a quarter of a micron edge.

Pretty sensitive and precise test, indicating a very sharp fine edge.

Only knife that sharp will cut a circle in a light paper.



Cigarette rolling paper test done on Tally-Ho or Rizla Green rolling paper (approx. 17gsm). The test has two gradations: longitudinal and cross push-cut.

Longitudinal push-cut: Holding the cigarette paper vertically, slice the end to get the blade into it, then push-cut down.

Becomes possible at 110 BESS, i.e. about 0.2 micron edge.

That sharp out of the box are only some professional meat processing knives – this test therefore can serve as a “**gold standard**” for butchers, kitchen knives and alike.



Cross push-cut: Holding the cigarette paper horizontally, slice the non-gummed end to get the blade into it, then push-cut down.

Becomes possible at 35 BESS or about 0.07 micron edge, but cleanly performs only at 25-30 BESS or near 0.05 micron edge – at least as sharp as the best Feather DE safety razor. 0.05 micron edge is the minimum requirement to cross push-cut through the Tally-Ho or Rizla Green paper without first slicing it.

A knife with an edge of 40 BESS i.e. near 0.08 micron roughens the paper in the cross push-cut; while less sharp edges rip it.

This one is a highly precise test due to the standardized "test media".



HANGING HAIR TESTS

Human hair cuticles average 0.3-0.5 micron in thickness layered like roof shingles from the root upwards. Cutting edge must be less than this thickness to penetrate between them. Due to the fact that there are up to 10 layers of cuticles, it is possible to not only to split the hair lengthwise, but also whittle curls off a hair.

The test is performed with the edge angled to the root side of a hair for the edge to catch between the cuticles, at about 2cm out from where your fingers grip the hair.

Violin sign - the hair doesn't cut, but it "plays violin" with the edge.

This is due to the hair cuticles catching the edge, which is not sharp enough to penetrate between them. Your fingers holding the hair sense vibrations like from the violin string, and with certain blades you even can hear a faint ringing sound.

Your knife starts playing violin at 115 BESS or about 0.2 micron edge.

This one is a highly precise test.

From this point you are ready to delve into the true razor-sharp level, not just shaving-sharp.

Cut a free hanging hair - becomes possible at 70 BESS or 0.15 micron edge.

You cannot split the hair yet, but already can slice it. Note that at this stage it is not a popping cut, you have to slice the hair.

Split hair - the edge catches the hair between cuticles and splits it lengthwise.

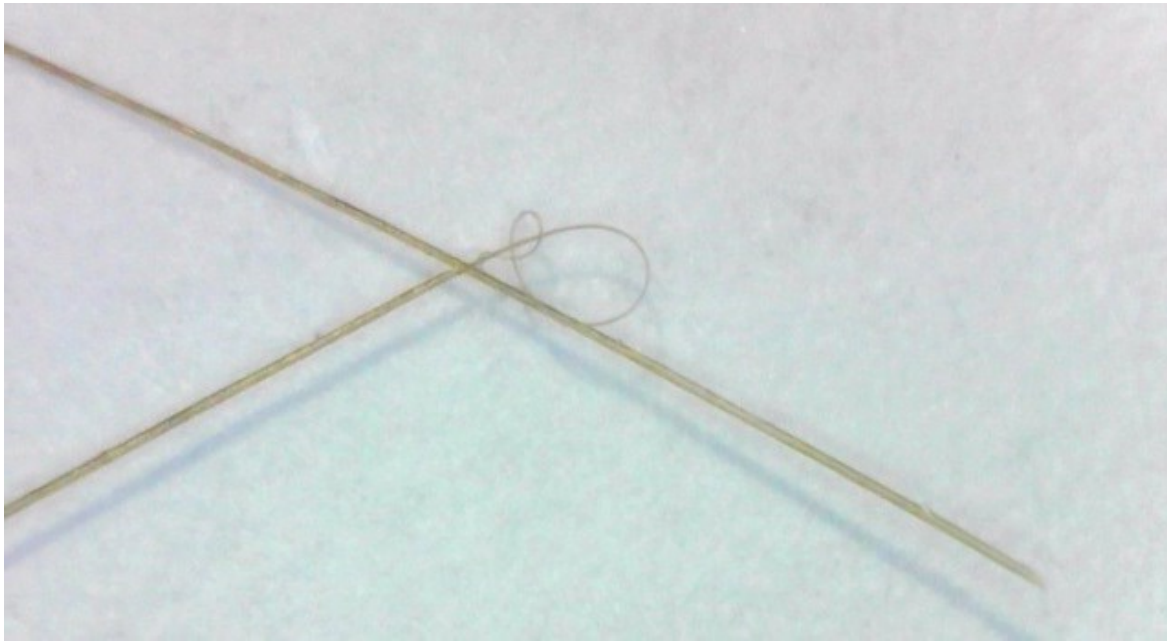
60 on BESS scale is where the edge starts splitting a hair; the edge apex thickness is near 0.1 micron – as sharp as the Gillette double-edge safety razor.



Hair popping - the hair bends before it cuts, and the severed hair part will "jump away".

Requires at least 30 BESS or 0.05 micron edge. I couldn't make a hair pop with the 35 and 40 BESS edge.

Whittle hair (cut curls off a hair) – becomes possible at 25-30 BESS, i.e. ≤ 0.05 micron edge.



Silent slicer - at 20 BESS and under the hair falls effortlessly as soon as it touches the edge; not jumping away like with popping, just silently falls, indicative of a 0.01-0.03 micron edge.

* **BESS Score - Edge Width** correlation is true in the scale range from 10 to 400 BESS for a polished edge of finer-grained steels; but not for rough edges and edges off a coarse grit with pronounced toothiness.

With the most demanding tests, the edge oxidation affects the result. Practically it means that the most challenging sharpness tests like the top HHT that you can perform immediately after sharpening you can not a few hours later. Oxidation can easily change your sharper than razor edge to just razor sharp, which may not be enough for the most challenging tests.

Immediately before those tests the edge should be stropped on a plain smooth leather or linen to restore its original sharpness.