

## SHARPNESS CHART

Sharpness is determined by the edge width and radius at its apex.  
The chart uses two units of measurement to reflect sharpness:

**BESS** - an acronym for "**Brubacher Edge Sharpness Scale**", an international standard to numerically quantify sharpness.

BESS-calibrated edge sharpness testers show edge apex radius in nm, e.g. DE safety razors score 50 on the tester and have 50 nm apex radius, i.e. 100 nm or 0.1 micron edge apex width.\*  
(1nm = 1 billionth of a metre)

**Micron**: 1 micron ( $\mu$ ) = 0.001 millimetre (mm), or 1000 nanometres, or 10,000 angstroms.

The apex width values given in the chart for the "Traditional tests" are the least sharp edge that can perform the test cleanly (i.e. the earliest sharpness from the dullness end).

Note though that the BESS score tells the edge apex width only to a first approximation for these "traditional tests".

### CLASSIFICATION OF SHARPNESS

Description	BESS	Micron
<b>Dull.</b> The edge reflects visible light.	over 500	over 1
<b>Working edge</b> , real world sharp.	300-400	0.6-0.8
<b>Sharp.</b> E.g. quality cutlery out of the box.	250-300	about 0.5
<b>Very sharp.</b> E.g. utility knife blade The edge doesn't reflect visible light.	150-200	0.3-0.4
<b>Shaving sharp.</b> (see all gradations below)	160	0.3
<b>Wickedly sharp.</b> Edges under 0.3 micron, less than thickness of a human hair cuticle.	under 150	under 0.3
<b>Nuts sharp</b>	100-150	0.2-0.3
<b>Scary sharp</b>	100	0.2
<b>Crazy sharp</b>	under 90	under 0.2
<b>Insane sharp</b>	50-80	0.1-0.15
<b>Razor sharp</b>	under 50	under 0.1
<b><u>SHAVING SHARP GRADATIONS</u></b>		
- <b>scraping shaving</b> A toothy edge is capable of catching hairs on the skin, but instead of cutting them it "rips" them out of your skin.	160	0.3
- <b>shave forearm against the skin with the grain of hair</b>	140	about 0.25
- <b>shave forearm against the hair grain</b>	100	0.2
- <b>shave without touching the skin; smooth shaving</b>	30-50	under 0.1
- <b>tree topping</b> You can run the edge down above the skin and cut free standing hairs in the middle.	25-30	0.05

## TRADITIONAL SHARPNESS TESTS

**Thumb Pad Test** - feeling the edge crosswise with the ball of your moistened thumb. Draw your 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 it is false, as it is 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 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.

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 printer paper** – a knife can do it at 450 BESS or 0.9 micron, which is the upper limit of the working edge.

Not a very clean cut initially, but already effortless; the sharper the edge the cleaner the cut.

**Slices newsprint** (approx. 50gsm) – 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, the 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 printer paper**, i.e. shaving off layers of 80gsm paper not cutting through. An edge is able to shave 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 light printer paper.

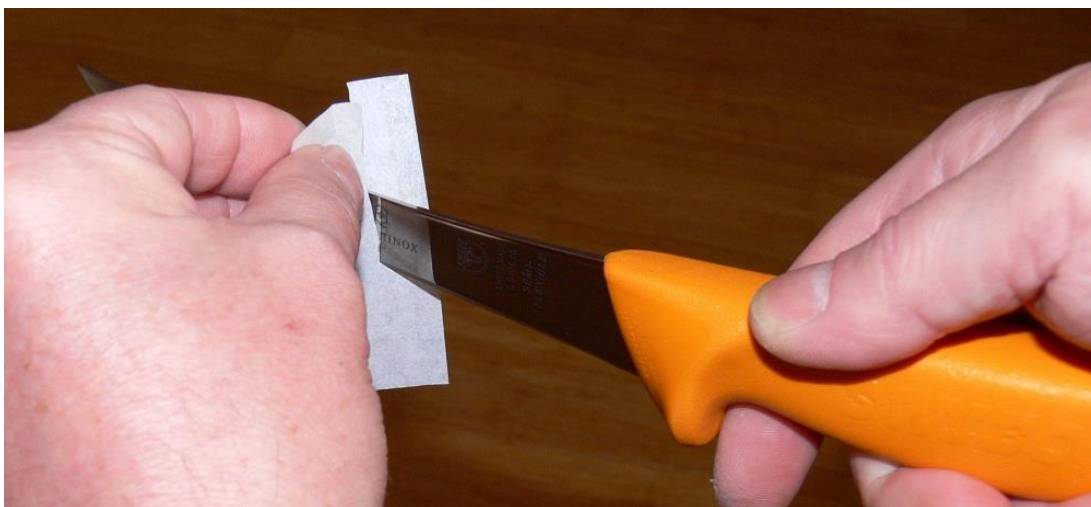


**Cigarette paper test** done on Tally-Ho or Rizla Green rolling paper (approx. 17gsm). The test has two gradations: longitudinal and cross push-cut.

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

Becomes possible at 30 BESS or about 0.06 micron edge, but cleanly performs only at 20-25 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 true push-cut through the Rizla Green paper edge, without first slicing it.

A knife with an edge of 35 BESS i.e. near 0.07 micron roughens the paper in the cross push-cut; while the less sharp edges rip it.

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



## **HANGING HAIR TESTS**

Human hair cuticles average 0.3-0.5 micron in thickness layered like roof shingles. Cutting edge must be within this range of thickness to penetrate between them.

Due to the fact that there are up to 10 layers of cuticles, it is possible 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.

You can sense the violin-like vibrations, and with certain blades 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.

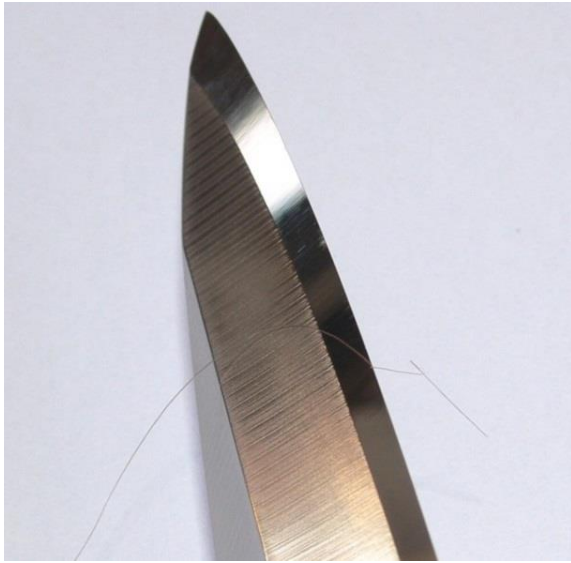
From this point you are ready to delve into the true razor-sharp level, not just shaving-sharp.

**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.

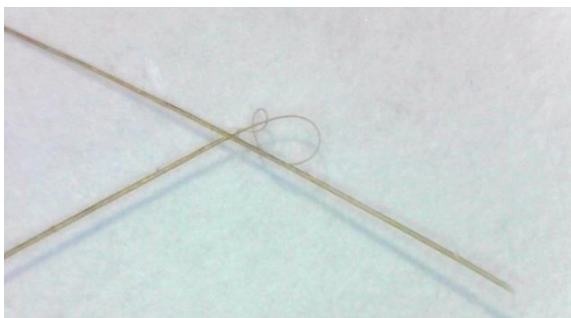


**Split hair** - the edge catches the hair between cuticles and splits it lengthwise.  
60 on BESS scale is where the edge starts splitting a hair; the edge apex width is near 0.1 micron.



**Hair popping** - the severed hair part will jump away as soon as it touches the edge.  
Requires at least 30 BESS or 0.05 micron edge. I couldn't make hair pop with 35 and 40 BESS edge.

**Whittle hair** (cut curls off a hair) – becomes possible at 25-30 BESS.



**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 0.01-0.02 micron edge.

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

For more info see [www.EdgeOnUp.com](http://www.EdgeOnUp.com) , [bessu.org](http://bessu.org) and [www.bessex.com](http://www.bessex.com)

With the most demanding tests, the edge oxidation affects the result. Immediately before those tests the edge should be stropped on clean smooth leather or clean linen to restore its original sharpness.

Chromium in stainless steel reacts with the oxygen in the air to form a passive chrome-oxide surface layer that prevents further oxygen from rusting the surface. This film thickness originally is 3-5 nm, but can reach 20 nm on mechanically polished surface, i.e. worsen sharpness score by 5 to 20 BESS.

5 to 20 nm added to the apex radius, multiplied by 2 in terms of the apex thickness, mean 0.01 to 0.04 micron of added edge apex width.

Practically it means that the most challenging sharpness tests like the top HHT that you can perform immediately after sharpening you can not an hour later. Oxidation can easily change your sharper than razor edge to just razor sharp, which is not enough for the most challenging tests.