Riflescope Clarity and Quality

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I am a research-aholic. It is not only what I do for a living, it is fun for me. So when I decided to buy a few riflescopes recently, the process was not a quick one. I have boughten scopes before, but that was several years ago and since that time, the variety of makes, models, and configurations has grown rapidly. Initially the whole process seemed overwhelming until I visited some of the big sport shops and actually took a look through the scopes. It became apparent that a great range of quality exists among the scopes and this first hand experience helped me make my decisions.

I based my final decisions upon the *apparent quality* of the optics (I say *apparent*, because it is difficult to evaluate a riflescope under artificial lighting), price, and my ability to match the scope to my rifle. By the latter, I mean that I stepped back from the advertising and marketing and reflected upon the demands I would place upon that scope in the field. For instance, one of the rifles I fitted with a new scope was a Ruger no. 1-H "Tropical" in .416 Rigby. This rifle is destined for dangerous game in Africa and so the scope I wanted needed to have low-magnification and a quick reticle. The scope I chose was a Zeiss Conquest 1.8-5.5X with the number 4 German reticle.

Most recently I have given some thought to developing an objective method to assess the quality of a riflescope. While there is value to the bullet drop compensators and sundry other features common today, I will argue that when push comes to shove it is the *quality of the optics* that is most important. Based upon this, I developed a simple experiment that anyone should be able to duplicate for themselves.

The experiment was designed to assess 1) the clarity of the scope at both the focal point and the edge of the scope under regular daylight as well as twilight hours, and 2) calculate the effective field of view.

Here is what I did. First I took a full sheet of newsprint (see above) and secured it just as you would a target at a shooting range. I then setup my bench rest at a distance of 25 yards. Beginning at 4pm on a sunny October afternoon I viewed each riflescopes (from the secure bench) and assessed their quality.

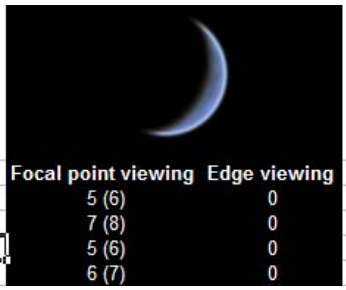
Redfield low-profile widefield, 1 ¾ - 5X
Leupold VX-III 2.5-8 X
Zeiss Conquest 1.5 – 5.5 X
Springfield Armory Tactical 4-14X (30mm tube)

The reticles were centered just beneath the headlines on the left side of the newsprint target ("Bengals have no answers") with the viewing edge of each scope resting near the "6.99% 7.49%" advertisement on the right side of the newsprint. As each scope was capable of 5X viewing this is the setting that was used throughout the experiment.

The first test was a objective clarity test to determine if the headlines at the focal point could be clearly read, followed by a similar clarity test for the edge advertisement. Each of these tests was given 10 pts and a pass/fail rating (in other words, 0 or 10 points).

The second test was a more subjective clarity test where other text was read (notice the pumpkin and quilting stories) and a score given between 0 and 10 reflecting the crispness, contrast, and ability to read these items with the scope.

The clarity tests were conducted under twilight conditions beginning at 7pm on the same day. A slightly different criteria was applied that was not used earlier in the day. Using the graph of gray bars just above the edge advertisement on the newsprint I attempted to count the number of bars that were clearly visible through the scope (without having counted them first of course). The number of bars clearly counted was recorded as objectively as possible (there was no crispness/contrast rating given during the twilight assessment). The results of these neat little test are shown in the table below.



Scope	Focal point viewing	Edge viewing	Crispness/Contrast	Focal point viewing	Edge viewing	Score A
Redfield	10	0	5	5 (6)	0	15
Leupold	10	10	7	7 (8)	0	27
Zeiss	10	10	9	5 (6)	0	29
Springfield Armory	10	10	8	6 (7)	0	28

Note: under the twilight "Focal point viewing" column, two numbers are given. The first is the score (0-10) and the second (in parenthesis) is the actual number of bars counted. There were 12 bars on the graph.

Some rather interesting results are worth noting. First, there was a real and obvious difference in the clarity of these scopes. What's more is how crisp the Zeiss scope appeared. Not only was the text readable, it seemed to jump off the print. I attribute this to the coatings applied to this scope by Zeiss.

The next part of the test was to determine the effective field of view. Sure, one could look up the FOV on the manufacturers website or brochure, but how much real estate can we really see in a side-by-side comparison at 25 yards? Determining this was straight-forward and required little more than a steel tape measure and the assistance of my family. The results are shown on the following table.

Scope	Effective FOV @ 25 yds	Score B
Redfield	6' 8"	10
Leupold	6' 5"	9
Zeiss	5' 2"	7
Springfield Armory	5' 4"	8

Note: the scoring on the field of view test resulted in the scope with the broadest FOV receiving 10 points while the rest were pro-rated in proportion with this value.

The only thing left to do was to add the results together and that of course was simple enough.

Scope	Score A	Score B	Final Score
Redfield	15	10	25
Leupold	27	9	36
Zeiss	29	7	36
Springfield Armory	28	8	36

What do you know! In a test between four riflescope we end up with a three-way tie. That is actually very interesting because first of all, these scopes certainly did not cost the same. In fact there was a few hundred dollars separating pricetags on these riflescopes. Secondly, the Springfield Armory scope should have been the clear winner. It has the largest objective (56mm) and the largest tube (30mm) which should have enabled it to win the clarity experiment hands-down. To be honest, it is still my favorite scope because it is tough and loaded with features that I find useful when I am target shooting and varmint hunting. These same features though, I do not want on my big game and dangerous game rifles like the Zeiss that is mounted on my .416 Rigby and the Leupold that is mounted on my 7mm Rem Mag deer and antelope rifle.

The bottom line is that you do not have to pay a fortune for a top-of-the-line riflescope and the Leupold certainly represents a great value to American hunters.