

# Average Eyepiece Choices

Generally a new telescope arrives with one or two Plössl eyepieces to get one started. At some point one may wonder about getting another eyepiece to improve the views, and often sticker shock occurs when checking out the fancy eyepieces from Televue, Explore-Scientific, Pentax, etc. Sure, premium eyepieces are very worthwhile and some observers will strongly advise one to buy once and get the "best" (whatever that is), so if funds are not a concern, then you should skip this entire discussion. However a limited budget may drive purchases to somewhere else, but where?

Of course, telescope features will limit one's choices, starting with the size of the focuser (1.25 or 2 inches). Also, the telescope focal ratio (aperture divided by focal length), if "slow" (8 or more) will work well with just about any eyepiece, and if "fast" (5 or less) will require more expensive eyepieces to provide a clean view of pinpoint stars from edge to edge. Even though just about every eyepiece will provide a pinpoint image in the very center of the view, less complex (less costly) eyepieces often produce fuzzy star distortions near the field edges when subjected to the wider, more angled light rays of "fast" telescopes. Over the years eyepiece designs have advanced to attain a sharp, wide field of view, but at a non-trivial cost.

Individual eyeball differences and viewing preferences also play a role. Near- and far-sightedness can be focused (adjusted) out, but non-minor astigmatism will require corrective lenses for low-power views, hence the eyepiece eye relief (distance between the eyepiece and eyeball) will need to be ~15mm or so. Even without eyeglasses, this amount of eye relief means that viewing is much more enjoyable and is less prone to lens fogging from eyeball moisture during cool observing nights. The apparent field of view (or window of the sky) that one sees in an eyepiece is a viewing preference, for most eyes can concentrate only on the view in about a 45-degree angle, and typical Plössl eyepieces provide about a 50-degree apparent field of view (AFOV). Some eyepieces can provide 80 to 100 (or more) degrees of AFOV to allow sensing the starry neighborhood around the object being studied, but that comes with a significant price tag for enjoying a panorama of stars, and/or to watch an object leisurely drift on by. Spending priorities are not the same for everyone, especially for this hobby. I believe that many observers, but not all of course, will enjoy eyepieces providing a 55- to 65-degree AFOV.

So if the telescope focal ratio is forgiving (or if not, then one might consider accepting some star distortions at the field edges) and if a super-wide field of view is not mandatory, then there are less expensive but very serviceable eyepieces available, even if one must wear eyeglasses while observing. The ones mentioned below include 1.25-inch eyepieces that I have used, or still use, and that are still on the market as I write this (eyepiece brands and models are continually changing; over the years many have been discontinued in this small, niche market). Other similar eyepiece brands not mentioned below should be about equally suitable.

There are the long eye relief (~20mm) models, made by Long Perng and branded by Orion Telescopes (Edge-on Planetary) in focal lengths of 3.0, 5.0, 6.0, 9.0, 12.5, and 14.5mm, each with an AFOV of ~55 degrees. I have, use, and enjoy the 9.0 and 14.5 focal lengths, for viewing our Sun and open star clusters, respectively. They cost around \$100 each.

There are the 60-degree AFOV models, made by Barsta International; one brand by Astro-Tech (Paradigm or Dual-ED), and another by Agena Astro (Starguider Dual-ED), of focal lengths 3.2, 5, 8, 12, 15, 18, and 25mm, all with ~13 to 18mm of eye relief. I owned and used a set of 8, 12, 15, and 25 Paradigms, but sold them only because they were gathering more dust than photons. They cost around \$70 each.

Sky gazers wiser than me have said, with eyepieces one may enjoy only two of three features: wide-field, inexpensive, (optically) good. The above eyepiece ideas are not perfect and may not satisfy all observers, but these ideas are mindful of a limited budget and should provide decent views that are wider (perhaps more engaging) than Plössls, and also with additional eye relief, especially in the shorter focal lengths.

Selecting which eyepiece focal length to purchase is another, separate discussion/article. And other observers can surely explain premium eyepiece options and discuss eyepiece aberrations. It has been said that novices looking through an eyepiece see stars, while experts see optical aberrations, so I hope to remain a novice.

