Eyepiece Barrels & Threads

Portions Contributed by Kevin Ferguson, Tom Krajci, and LaVerne Karras

Note the holes in the tables below. Know the answers? Send them to me at matt@atmpage.com or use the feedback form. Ditto if you find any errors!

Also, it is common for many filter threads to seem to have the wrong pitch, but since they only engage over one or two threads, they usually work. When I had my CCD camera threaded for filters by a professional machine shop, I gave them the specs and a working filter/eyepeice combination for comparision. The machinist cut threads for me that work, but he said that the filter (from Orion) and eyepeice (TeleVue) didn't exactly match each other or the spec!

	1¼ "	2"
Dimensions		
Barrel OD	1.25"	2.00"
Drawtube ID	1.253" ± 0.001	2.004" ± 0.001
Filter Threads		
Pitch Diameter	28.5mm	48mm
Pitch	0.6mm	0.75mm
Depth	0.16" ± 0.03	
Relief	0.06"	
Major Diameter	1.1169"	
Minor Diameter	1.1011"	

Remember that in cold weather an aluminum drawtube will contract more that a plated brass eyepiece barrel, so a little extra clearance (0.002" - 0.005") is not a bad thing.

	T-Mount		C-Mount	CS-Mount
	Internal	*External*		
Pitch Diameter	41.57mm ± 0.04	41.44mm ± 0.04	1"	1"
Pitch	0.75mm	0.75mm	32 tpi	32 tpi
Depth				
Relief				
Major Diameter	42.02mm min	41.93mm ± 0.04		
Minor Diameter	41.25mm ± 0.04	41.17mm max		
Shoulder to Focal Plane	55mm		17.5mm	12.5mm

Tips for Tapping

- Consult a table or calculate the proper size hole, **do not guess!**
- Use a lubricant or coolant designed for the metal you are tapping. Use motor oil or candle wax if nothing else is available.
- Back the tap out of the hole every 2-3 turns, or at the first sign of binding; and blow the chips out of the hole

(mind your eyes).
- Especially in aluminum, the tap can bind even when backing out. Turning it back and forth ¼ turn can often clear the wedged chip and ease the binding.
- Use great care to start the tap in line with hole. If possible clamp the work on a drill press table, drill the hole, put the tap in the drill chuck without unclamping the work, and turn the chuck by hand to start the thread. **DO NOT "power tap"!**
- Four ways to break a tap:
    1. Drill the wrong size hole.
    2. Put side force on the tap.
    3. Don't clear the chips often enough.
    4. Use an old dull tap.
- If you have a *lot* of work invested in a part, and break off a tap, you may be able to get a machine shop to burn it out for you. Just present yourself in a very humble way, it happens to them too! If you think you can drill it out, you're dreaming.
- If you break a tap in any material **other than steel** you can remove the tap by submerging the part in a solution of alum and water. The steel tap will be corroded but not the part.
- Due to stretching, nylon, plexiglass & teflon typically end up with *very* tight threads when tapped. I have had good results by tapping normally, then putting the plastic and tap in the freezer until well chilled, then chasing the thread while everything is still very cold.
- Turn taps very slowly in plexiglas. It is prone to melting and gumming up.

Other Notes

- Camera tripod thread is ¼ " x 20 tpi.
- Old Pentax cameras used a screw mount lens that is the same diameter as a T thread, but **not** the same pitch (1 per mm vice 0.75). It looks like they will screw together, but you'll mess up both if you try. Some other cameras like the Russian Zenit brand use this same Pentax thread.
- Normal anodizing adds about .0005" to each surface which will tighten an external thread by .002". *Hard* anodizing can add 4-6 times more. If this is not desired, specify a "controlled etch" in your instructions to the plating house. Anodizing will be very much thinner in internal threads, especially if the thread is long. *Note: Anodize build-up may be specific to techniques used in American plating firms, telescope makers and machinists in Australia report no problems with this.*
- "Never Sieze" can help prevent binding in bare aluminum threads. Available at any BMW motorcycle shop, if you can't find it elsewhere.
- If aluminum threads will see frequent assembly, consider using a Helicoil, Keensert, or similar steel liner.

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