

PTI Technical Note

The Advantages of Thermally-Matched Optics

Competitors have challenged PTI's design, but none have been successful. The reason is simple: Only PTI can guarantee that the reflector retains its shape perfectly at high operating temperatures—sometimes in excess of 150 degrees Celsius. The thermally-matched reflectors in the A-1010B and A-6000 housings are proprietary designs manufactured exclusively by PTI.

The unique reflector begins with a solid block of aluminum (600 grams for the A-1010B, 3 kilograms for the A-6000). A computer-controlled machining center carves out a perfect ellipsoid shape. Then the surface is polished to roughness specification of less than 100 Angstroms to maintain reflectance deep into the UV. Finally, the reflector is coated with magnesium fluoride to protect the aluminum and enhance UV reflectivity.



It is the sheer mass of the reflector that ensures the A-1010B's superb thermal stability. Because of the volume of the metal in the reflector, dimensional changes at operating temperatures are distributed evenly throughout the mass, thus precisely maintaining the ellipsoid shape.

This design approach eliminates the need to cool the reflector with an external water source, which results in several distinct advantages:

Reliability

An ellipsoid reflector is a fixed-focus system. You are entirely dependent on the shape of the ellipsoid for optimum performance. Cooling a low-mass reflector with a water circulation system with water temperatures and flow rates that will change from day to day will result in variations in the shape of the reflector, and the output will not be stable.

No reflector etching

The temperature of the cooling water is often below the dew point in the laboratory. This is most common in the summer when humidity is high. Failure to turn off the cooling water supply at the right time during the shut-down procedure will result in condensation on the reflector. The deposited impurities are etched into the reflector by UV radiation, decreasing collection efficiency.

Lower cost

Since there is no need for a recirculating water cooler or a thermal sensor to protect the reflector in the event of a failure in the cooling water supply, the A-1010B costs less.

Convenience

Not having to worry about properly cooling a reflector allows you to concentrate on your work. And, there is no chance of a catastrophic failure ruining an experiment or damaging equipment.



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