Reflecting Microscope Objectives

- Wide spectral band objectives
- Long working distances
- High numerical apertures
- Zero chromatic, negligible coma, spherical and astigmatic aberrations

APPLICATIONS
- UV Metrology & Microscopy
- Spatial Filtering
- Photomicroscopy
- Laser Energy Delivery Systems
- FT-IR Spectroscopy

Thermo Oriel's reflecting microscope objectives are reverse Cassegrains following the Schwarzschild design. Accordingly they have zero chromatic, negligible coma, spherical and astigmatic aberrations. We currently offer 15X and 36X objectives broadband coated with aluminum and MgF₂ overcoat. They are usable from 200 nm to 20 µm. Special coatings are available upon request, including MgF₂ optimized for the 157 nm to 195 nm region.

THE ADVANTAGES OF THERMO ORIEL'S OBJECTIVES

1. Single material construction (uniform coefficient of expansion)
2. Secondary mirror is integral (machined into) to "spider" assembly
3. Objectives are hand assembled in an interferometric setup; each pair of mirrors is optimized as a set for maximum resolution. Typical "spot size" available:
   - with 15X: 2 µm
   - with 36X: 1 µm
4. Near "diffraction limited" performance
5. Optical surfaces can be "low scattered" for use with high power UV lasers.

CONSTRUCTION

Our microscope objectives use all metal highly polished spherical mirrors. The objectives are designed with two mirrors positioned so they eliminate aberrations.

The first mirror has a spherical concave surface with a center hole. The second mirror is small, with a spherical convex surface. The mirrors are coated with aluminum and magnesium fluoride. Reflection per surface of each mirror is 85% average in the U-VVIS, and 90% average in the IR with a dip to 78% at 820 nm. On special order, dielectric coatings optimized for 248 and 308 nm are available, and gold for the visible to infrared. See figure on reverse for reflectance curves of metallic reflector coatings.

HOW THEY WORK

In a typical focusing application, collimated light passes through the aperture hole in the Primary Mirror, to the Secondary Mirror. The Secondary Mirror reflects and diverges the beam to fill the Primary Mirror. The Primary Mirror focuses the beam to a small spot called the Object Plane or Focal Point (see illustration below).

Above: The Thermo Oriel 15X and 36X reflective microscope objectives.

Above: A) Diagram of a typical focusing application of a Reflecting Microscope Objective; B) Illustration of the rear focal plane of the objective.
**Reflecting Microscope Objectives**

Above: Dimensional diagram of Thermo Oriel’s Reflecting Microscope Objectives.

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**Specifications**

Secondary Diameter:
- 13595: 0.450 inch (11.4 mm)
- 13596: 0.221 inch (5.6 mm)

Optics Material: Polished, electroless nickel

Obscuration:
- 13595: 27% of full field
- 13596: 17% of full field

Max Collection (half angle):
- 13595: 23.6°
- 13596: 30°

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**Ordering Information**

For other powers or for custom specifications, please contact the Thermo Oriel Sales Department.

<table>
<thead>
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<th>Power</th>
<th>N.A.</th>
<th>Working Distance (mm)</th>
<th>Focal Length (mm)</th>
<th>Field of View (mm)</th>
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Above: Typical reflectance curves of metallic reflector coatings.