

## CO<sub>2</sub> Laser Optics for Cutting Systems

ULO Optics offers a comprehensive range of optics for cutting systems: Lenses, Mirrors, Phase Retarders, Partial Reflectors, Beam Splitters, along with high-performance Multi-Element Assemblies.

### Introduction

Cutting optics form a crucial part of your laser system. ULO Optics understands the need to keep your system running, which is why we carry replacement stock for the most commonly used laser optics around the world. ULO Optics uses only the best laser grade material and highest quality coatings, producing low absorption lenses which are useful up to the highest power applications.

As well as ensuring we have the most commonly used optics available from stock, our experienced and highly qualified technical team is able to quote for your custom optical requirements.

The lists of optics on this page are far from exhaustive - for further information please visit our website, [www.ulooptics.com](http://www.ulooptics.com). The majority of our cutting lenses are made from ZnSe, although ZnS, GaAs and Ge lenses are also available.



1 | VTE500 meniscus lenses from ULO Optics

2 | A small selection of the plano-convex and meniscus lenses available from ULO Optics. We offer a wide choice of diameters, focal lengths and edge thickness to suit your laser system.

### Plano-Convex Lenses

Many laser systems have been designed to use plano-convex lenses as the standard focusing element. Some customers also prefer to use our plano-convex lenses at longer focal lengths where the spot size differential compared to meniscus lenses is less of a factor.

### Meniscus Lenses

Meniscus lenses form the largest and most popular part of ULO Optics' product range. Optimum meniscus lenses minimise the spot size which in turn increases power density.

You can find a selection of the most popular planoconvex lenses we offer in Table 1, and a selection of our most popular meniscus lenses in Table 2.

#### Note:

The most comprehensive and up-to-date list of lenses available from ULO Optics can be found on our website at [www.ulooptics.com](http://www.ulooptics.com)

**Table 1: Plano-Convex Lenses**

Part no.	Diameter (mm)	Focal Length (mm)	ET (mm)
11ZLP127	28	127	3.0
15HGPP127	38.05	127	6.2
15PHGP127	38.05	127	7.6
15PHGP190	38.05	190	7.6
20PHGP190	50.8	190	7.9
20PEHGP127	50.8	127	9.6
20ZLP1700	50.8	1700	3.5

**Table 2: Meniscus Lenses**

Part no.	Diameter (mm)	Focal Length (mm)	ET (mm)
7.5ZLF50	19	50	2.0
11ZLF63	28	63	3.0
11ZLF127	28	127	3.0
15ZLF127	38.05	127	3.0
15HGP127	38.05	127	6.2
VTE500	38.05	127	7.4
15HGP190	38.05	190	6.2
VTE750	38.05	190	7.4
20EHGP127	50.8	127	9.6
20ZLF127	50.8	190	3.5

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## Aspheric Lenses and Aberration Free Assemblies

Aspheric lenses and aberration free lens doublets are high performance alternatives to our short focal length ZLF series meniscus lenses. Both options give diffraction limited performance by correcting the spherical aberration that is present in a "best form" meniscus lens.

The aspheric surface is most effective in lenses of short focal length. A selection of the aspheric lenses we offer can be seen in Table 3.

The alternative solution to counter-acting spherical aberrations is through Umicore Laser Optics' TF series of aberration corrected double element lenses.

## Mirrors

ULO Optics offer Si, Cu, and Mo mirrors with various diameters and thicknesses. Our Si mirrors are extremely durable, and combined with our Supermax coating offer reflectivity greater than 99.85%. Cu mirrors, most suitable to higher power lasers are also Supermax coated to guarantee the same reflectivity. Another version of a Cu mirror is coated with Gold, offering a more economical alternative where 99% reflectivity is sufficient. These are commonly referred to as 'NiCu' type mirrors, due to a layer of Nickel underneath the Gold coating. Mo mirrors are damage resistant, long lasting and are often used in harsh environmental conditions due to their durable nature. Polished Mo mirrors generally reflect greater than 98% uncoated.

## Phase Retarders

ULO Optics offer a selection of **Cu** and **Si** phase retarders. Cu and Si phase retarders are offered with  $\lambda/4$  (90°) retardation. Umicore's coatings are optimised for the highest possible phase retardation accuracy.

## Partial Reflectors/Beam Splitters

The reflectance of standard beam splitters depends on the polarisation. ULO Optics have developed a superior polarisation insensitive coating which eliminates this problem, allowing components to be used to provide a 50:50 power split at 45° incidence angle, reflecting 50% of both S and P polarisation.

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Table 3: Aspheric Lenses

Part no.	Diameter	EFL	BFL	FFL	WD*
10ZAL25.4	25.4	25.4	21.7	19.9	18.9
11ZAL25.4	28	25.4	21.3	19	18
11ZAL38.1	28	38.1	35.4	34.7	33.1
11ZAL50.8	28	50.8	47.9	47.1	46.1
11ZAL63.5	28	63.5	60.8	60.1	59.1
15ZAL38.1	38.05	38.1	33.6	30.9	29.9
15ZAL50.8	38.05	50.8	47.2	45.6	44.6
15ZAL63.5	38.05	63.5	60.2	60	59
15ZAL95.3	38.05	95.3	92.4	91.6	90.6
15ZAL127	38.05	127	124.3	123.6	122.6

\* WD = Working distance when mounted in M10, M11 or M15 mount  
FL = Focal Length

There is a vast range of reflectivity options available on our partial reflectors, and we are happy to quote for options which we do not hold in stock.

## Multi-Element Lens Assemblies

Multi-element lenses combine high quality individual lenses to produce high performance solutions for a variety of applications. Umicore Laser Optics supplies twin spot and triple spot systems that have been custom designed to specific customer requirements. If you have a requirement for a dedicated solution please contact us today and let a member of our technical design team offer you a solution.

## Dual-Focus Lenses

Dual-Focus lenses are revolutionary lenses manufactured exclusively by Umicore Laser Optics, allowing thicker materials to be cut with a given laser power. Additionally, less assist gas is required in the process. To find out more about Dual-Focus lenses, please visit [www.ulooptics.com](http://www.ulooptics.com)

## Specifications and Tolerances

ULO Optics employs tight manufacturing tolerances to ensure that our customers receive a high quality product. It would be impractical to list all the tolerances for our individual product lines, so please consult our website at [www.ulooptics.com](http://www.ulooptics.com) where you can view the specifications of individual products.

