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## **MATERIAL SAFETY DATA SHEET (MSDS)**

### **1. Part Description:**

- Name of product: ZnSe lenses for high power CO<sub>2</sub> lasers (Clear Magic™).
- Identification code: These lenses will be recognized by p/n with 5 to 7 numbers and the letters ULA which means ULTRA LOW ABSORPTION.

### **2. Purpose:**

- This document describes the best information and technical properties we know about Ophir's CO<sub>2</sub> ULA lenses. The new lens uses the same top layer as Black Magic™ which offers superior cleaning properties and scratch resistance. Its transparent coating allows HeNe beam to be seen on the work piece, while polarizing filters help to detect thermally-induced stress.

**Manufacturer/Supplier:** Ophir Optronics Ltd.

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**Remark:** All the information about the raw material properties (ZnSe) of the lenses is well based on Ophir's supplier's MSDS.

### **3. ZnSe Raw Material details:**

3.1 **Form:** Solid Optical Element

3.2 **Chemical family:** Inorganic chemical belonging to the II-VI compound group

3.3 **Hazardous ingredients:**

<b>Material or component</b>	<b>% Atomic</b>
Zinc	50%
Selenium	50%

### **3.4 Physical properties:**

- Boiling point, 760 mmHg: sublimes
- Melting point: 1525 Celsius
- Specific gravity (H<sub>2</sub>O=1): 5.27
- Solubility in H<sub>2</sub>O, % by weight: Insoluble - Appearance and odor: yellow transparent solid, odorless

### 3.5 Flammability and explosive properties

Flash point (test method): Not flammable and not explosive.

### 3.6 Health hazard data

#### 3.6.1 Threshold limit value:

Material	Limit
Zinc Oxide fumes	5 mg/m <sup>3</sup>
Zinc Oxide dust	10 mg/m <sup>3</sup>
Selenium and compounds	0.2 mg/m <sup>3</sup>

#### 3.6.2 Effects of overexposure:

ZnSe - Effects are not known, but some zinc and selenium can be formed, such as:

- Zinc oxide - Chills and fever.
- Selenium and compounds - Acute exposure might produce sternal pain, cough, nausea, pallor, coated tongue, gastro-intestinal disorders, nervousness and/or conjunctivitis. A garlic odor of the breath or sweat may occur.

#### 3.6.3 Emergency & First Aid Procedures: In dust form:

Eyes: Wash with plenty of water - See physician

Skin: Wash with plenty of water - See physician

Ingestion: Call physician

Inhalation: Remove from exposure, treat symptomatically, call physician

### 3.7 Reactivity data

- Stability: Stable
- Conditions to avoid: Extreme heat greater than 500 Celsius could result in decomposition.
- Materials to avoid: Strong acids, strong bases.
- Hazardous decomposition products: Selenium/Oxides of Selenium, Zinc Oxide
- Hazardous polymerization: Will not occur.

### 3.8 Special protection information (for ZnSe processing, such as machining, grinding and polishing)

In case of vaporization: Leave room and allow dust to settle. Clean all surfaces. If room has ventilation, allow for several air changes. Locate exhaust near location of ZnSe processing, or use if failure by melting is likely.

### 3.9 Special precautions

Handling and storage precaution: If material is to be machined, ground or polished, processes should be done wet so as to minimize dust, which could result in inhalation. Good work practices such as keeping hands clean and not letting slurry splash significantly should be followed so that transferal to mouth by contamination on the hands or clothing followed by ingestion will not occur. Wash hands and face thoroughly after handling material and before eating. If parts are dropped or otherwise broken, sweep up pieces which may have sharp edges as one would clean up broken glass and safely transfer to disposal container.

## 4. Coated lens:

4.1. Maximum temperature operation: 500 deg. Celsius.

4.2. Form: Solid optical element.

4.3 Chemical Family: Inorganic

4.4 Color: Black- Not transparent in visible light.

#### 4.5 Handling:

- Conditions to avoid: Acids and strong bases.
- Cleaning: Coated lens has to be cleaned with soft, wet tissue or soft, wet cloth. Cleaning the lens with rough paper or cloth might cause scratches to the coating and destroy the lens.
- Cleaning materials: For cleaning of stains or fingerprints from the coated lens, Acetone, Alcohol or Ethanol can be used.
- Treatment before installation: The lens has to be cleaned and free of any stains or fingerprints before installation in the laser. Stain might cause high absorption and make the operation life of the lens shorter.

#### 4.6 Storage:

- The lenses are wrapped at Ophir with lens paper, nylon bag and hard plastic box. It is recommended to keep the lens in the same way until the usage. The polished surfaces of the lens are very sensitive and might be hurt when they are touching hard objects.
- It is recommended to keep the lenses in a low humidity conditions.
- Broken lenses: If parts are dropped or otherwise broken, sweep up pieces which may have sharp edges as one would clean up broken glass and safely transfer to disposal container. Then wash your hands with water.

#### 4.7 Disposal:

##### Return of Laser Optics

Federal environmental protection regulations require proper handling and disposal of ZnSe optics. As a service to our customers, Ophir and our partner Ophir Optics will accept used ZnSe CO<sub>2</sub> lenses from our customers regardless of their purchase origin. These optics will be evaluated either for use in non-cutting applications or be properly disposed of. Ophir Optronics Ltd. supplies only new optics to our laser customers, and does not regrind lenses.

Returned optics must be placed in a sealed plastic bag and should not contain any small particles. All returns should be clearly marked with a return authorization number on the outside of the package. Return authorization numbers can be obtained by contacting Ophir Optronics Ltd. Ophir reserves the right to refuse any shipments which do not meet these specified guidelines.

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