

ZnSe lenses for high power CO₂ lasers (Duralens™)Publication Date:
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Complying with Regulation (EC) No 1272/2008 (CLP) as amended by Commission Regulation (EU) 2015/830.

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING**1.1 Product identifier****Product name:** ZnSe lens for high power CO₂ lasers (Duralens™).
Identification Code: This lens will be recognized by p/n with 5 to 7 digits.**CAS Number:** Not applicable
EC Number: Not applicable
REACH No: Not available**1.2 Relevant identified uses of the substance or mixture and uses advised against:****Relevant identified uses of the product**ZnSe lens for high power CO₂ laser (Duralens™).**Uses advised against**

Uses other than as mentioned above.

1.3 Details of the supplier of the safety data sheet**Company Name:** Ophir Optronics Solutions Ltd.
Company Address: Hartom 6 Jerusalem**Company Tel:** + 972-2-5484444
Contact Name: Dvir Frankel**E-mail address of person responsible for this SDS:** Dvir.Frankel@ophiropt.com**1.4 Emergency telephone number**

24h/24h (Telephone advice: English) +972-52-2286063

SECTION 2: HAZARDS IDENTIFICATION**2.1 Classification of the substance or mixture**

Classification in accordance to Regulation (EC) No. 1272/2008 (CLP/GHS)

Product name	GHS Classification
ZnSe lens (Duralens™).	Acute toxicity, Oral (Category 3) H301 Acute toxicity, Inhalation (Category 3) H331 Acute aquatic toxicity (Category 1) H400 Chronic aquatic toxicity (Category 1) H410

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2.2 Label elements

Labeling in accordance with Regulation 1272/2008 (CLP)

Hazard pictograms:



Signal word:

DANGER

Hazard statements:

H301+H331 - Toxic if swallowed or if inhaled.
H410 - Very toxic to aquatic life with long lasting effects

Precautionary Statements:

P201 - Obtain special instructions before use.
P260 - Do not breathe dust/fume/gas/mist/ vapours/spray.
P262 - Do not breathe dust / fume/ mist.
P273 - Avoid release to the environment
P301+P310+P330 - IF SWALLOWED: Immediately call a POISON CENTER /doctor. Rinse mouth.
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.

Supplemental Hazard Statements.

None known

2.3 Other hazards

The optical coating is defined as a Radioactive Sealed Source with a layer of Thorium Fluoride embedded in the structure. The dosage is extremely low and well below any notifiable levels but care must be taken not to scratch the coating and release any Thorium Fluoride. Low level Radioactive sealed source component.

This substance/mixture contains no components considered to be either Persistent, Bioaccumulative and Toxic (PBT), or very Persistent and very Bioaccumulative (vPvB) at levels of 0.1% or higher.

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SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**3.1 Substance** : Not applicable**3.2 Mixtures:**

Product/ Ingredient name	Identifiers	%	Regulation (EC) No 1272/2008	M Factor	SCL
Zinc Selenide	CAS No 1315-09-9 EC No 215-259-7	~ 99.5%	Acute Tox. 3 Oral; H301 Acute Tox. 3 Inhalation; H331 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	n/a	n/a
Thorium Fluoride	CAS No 13709-59-6 EC No 237-259-6	0.003 – 0.48%	Skin Irrit. 2; H315 Eye Irrit. 2; H319 STOT SE 3; H335 Add. Effects Lact; H362 STOT RE 2; H373 Repr. Tox. 2; H361	n/a	n/a

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in section 8.

SECTION 4: FIRST AID MEASURES**4.1 Description of first aid measures**

General information: Consult a doctor for specific advice.

Eyes contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses if worn. Get medical attention immediately.

Skin contact: Wash thoroughly with soap and water. Dry area with clean towel. Remove contaminated clothing and wash clothing before re-use.

Inhalation: Remove to fresh air. Perform artificial respiration if breathing has stopped. When breathing is difficult, properly trained personnel may administer oxygen. Keep affected person warm and at rest. Obtain medical attention.

Ingestion: Do not induce vomiting. Wash out mouth thoroughly with water and give 2 cups of water to drink. Do not give carbonated drinks. Never give anything by mouth to an unconscious person. Obtain medical attention immediately.

4.2 Most important symptoms and effects, both acute and delayed

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Toxic by ingestion and inhalation of dust, with a cumulative effect. Affects nervous system. Particular care must be exercised when machining and creating dust or particles. Inhalation of dust may irritate respiratory system. For further information see section 11.

4.3 Indication of any immediate medical attention and special treatment needed

If any symptoms are observed, contact a physician and give them this SDS sheet.

SECTION 5: FIREFIGHTING MEASURES**5.1 Extinguishing media**

Suitable extinguishing media: Not flammable. Use an extinguishing agent suitable for surrounding fires such as water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media: None known

5.2 Special hazards arising from the substance or mixture

Material may evolve toxic fumes in a fire, with decomposition at temperatures greater than 400 °C in air and greater than 800 °C in an inert atmosphere. The material sublimates into zinc & selenium fumes.

Hazardous combustion products:

Zinc/zinc oxides, Selenium/selenium oxides.

5.3 Advice for firefighters

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Wear other appropriate protective equipment as conditions warrant (see Section 8).

SECTION 6: ACCIDENTAL RELEASE MEASURES**6.1 Personal precautions, protective equipment and emergency procedures****For non-emergency personnel**

No action shall be taken involving any personal risk or without suitable training.

Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering.

For emergency responders

Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Wear appropriate protective equipment, such as gloves, goggles and protective clothing, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

6.2 Environmental precautions

Do not allow material to contaminate ground water system. Prevent product from entering drains. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways or air).

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

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See Section 1 for emergency contact information.
See Section 13 for disposal information.

SECTION 7: HANDLING AND STORAGE**7.1 Precautions for safe handling**

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid all personal contact. Avoid contact with skin. Avoid contact with eyes. Avoid prolonged exposure. When using, do not eat, drink or smoke. Use personal protective equipment as required. Wash thoroughly after handling. Avoid release to the environment.

THE HANDLING OF ZINC SELENIDE OPTICAL ELEMENTS COATED WITH RADIOACTIVE THORIUM COMPOUNDS

During normal handling or cleaning THERE IS NO RADIATION HAZARD TO THE OPERATOR as the closed elements contain so very little radioactive material, i.e. approximately 4.6 Becquerels per cm⁻² of coated surface.

The handling of scratched coatings should present very little hazard to personnel, however the following should be noted.

When the surface of the optical element becomes scratched, it is possible for a small amount of the thorium coating to be removed. This liberated thorium coating may present a minor hazard if inhaled or ingested, the magnitude of the hazard being directly proportional to the quantity of thorium released. A small scratch 0.1mm wide and 1cm long would allow the release of about 8×10^{-6} g of thorium. This is equivalent to an activity of 0.05Bq.

This figure should be compared to the permitted dosage limit which is between 10kBq and 100kBq per year dependent upon the exact proportion of the thorium isotopes. This low level is encouraging but at all times it is necessary to apply the principle of dosage being as low as reasonably achievable regarding the potential for the ingestion of radioisotopes.

The International Commission on Radiological Protection and the British Ionising Radiations regulations 1985 require not only to stay within dose limits but also to keep radiation doses to individuals to the minimum which can be practically achieved.

Thus it is advised that simple precautions are taken when handling scratched elements aimed at minimising skin contamination and preventing material inhalation and ingestion. Accordingly, we advise the use of vinyl or rubber gloves, together with a protective mask or filter respirator such as a 3M 9920. Operators should wash their hands thoroughly after contact with damaged elements. The use of elaborate protective clothing and radiation monitoring is considered excessive. To remove loose material from scratched surfaces it is recommended that a clean, soft, cotton cloth dampened with acetone to be used. Gently wipe away any loose delaminated material from the scratch and its adjacent area. The cloth should be sufficiently wet to allow the loose material to be lifted and retained in the cloth. Used cloths, gloves and masks should be disposed of in a plastic bag, which should be sealed for disposal.

INSTRUCTIONS FOR HANDLING BROKEN COATED ZINC SELENIDE ELEMENTS

Dealing with broken or smashed optical elements presents similar hazards plus the additional danger of skin cuts and punctures produced by the broken substrate material as this is an additional potential route for the ingress of thorium. It must be emphasised that for physiological reasons ingress of thorium through skin wounds is more hazardous than the intake of the same amount of material by the oral route. Any wounds or skin lesions must be cleaned and dressed before any individual continues in the clear up operation. If a component is accidentally smashed, several smaller CLOSED SOURCES are produced from the one large element; only a small proportion of the contained thorium will be exposed or released.

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Cleaning up should be performed by an operator wearing a disposable mask and gloves, together with a disposable paper coat to prevent any smaller fragments of the element becoming trapped in everyday clothing. Smaller fragments should be gently swept up using a plastic brush and dustpan avoiding the production of airborne dust. Place the broken fragments, dustpan & brush, dust respirator & mask, gloves and paper coat into a cardboard box, which should then be placed into a plastic bag and sealed for disposal.

GENERAL INFORMATION

- i) Thorium is potentially harmful if inhaled or ingested, therefore all eating, drinking and smoking should be prohibited in relevant working areas. After handling coated optical elements hands should be thoroughly washed immediately.
- ii) Natural thorium contains three isotopes, thorium 232,230 and 228. The radiations emitted include gamma rays and alpha particles. Alpha particles have the greater radiobiological significance.
- iii) A becquerel (Bq) is equivalent to 1 nuclear disintegration per second. $1 \text{ Bq} = 27 \times 10^{-12} \text{ Ci} = 27 \text{ pCi}$ $37000 \text{ Bq} = 1 \mu\text{Ci}$
- iv) In the event of an incident involving the release of radioactive material, the use of a contamination monitor to examine both personnel and the working environment is considered advantageous, though perhaps not essential in view of the very small activities present. If your company employs a Radiation Protection Advisor they will be able to advise you on suitable types of instruments.

7.2 Conditions for safe storage, including any incompatibilities

Keep away from foodstuffs. Keep away from acids and strong bases.

7.3 Specific end use(s):

Optical Material Manufactured as Optical Components.

SECTION 8: EXPOSURE CONTROL / PERSONAL PROTECTION**8.1 Control parameters**

Occupational exposure limit values:

Ingredient name	CAS Number	Occupational exposure limits		Source
Zinc selenide	1315-09-9	STEL	No data available	EH40 Workplace Exposure limits
		TWA	0.1 mg/m ³	
		TWA	No data available	Europe. Indicative occupational exposure limit values

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Thorium Fluoride	13709-59-6	STEL	No data available	EH40 Workplace Exposure limits
		TWA	2.5 mg/m ³	
		TWA	No data available	Europe. Indicative occupational exposure limit values

8.2 Exposure controls

Appropriate Engineering Measures

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommend exposure limits. If user operations generate vapours, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Individual protection measures, such as personal protective equipment:

Eye and face protection:

Safety goggles or safety glasses with side shields are required if there is any possibility of chipping or dust creation. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection:

The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace

Hand protection:

Protective gloves made of PVA or rubber are required. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Other skin protection:

Use of a laboratory coat is suggested. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection:

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)

Thermal hazards:

None known

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Environmental exposure controls:

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**9.1 Information on basic physical and chemical properties**

Appearance:	Solid.
Colour:	Reddish-yellow
Odour:	No odour
Odour threshold:	No data available
pH:	No data available
Melting point/Freezing point:	1525°C *
Initial boiling point/boiling range:	Not applicable
Flash point:	Not applicable
Evaporation rate:	Not applicable
Flammability (solid, gas):	Not applicable
Upper/lower flammability or Explosive limits:	Not applicable
Vapour pressure:	Negligible at 25°C
Vapour density (air=1):	No data available
Relative Density:	5.27 g/mL
Solubility(ies):	Practically insoluble
Partition coefficient Octanol/Water:	No data available
Auto-ignition temperature:	No data available
Decomposition temperature:	No data available
Viscosity:	No data available
Explosive properties:	No data available.
Oxidising properties:	Oxidises at 300 °C

9.2 Other information:

* Oxidises at 300 °C, exhibits plastic deformation at 500 °C and dissociates at about 700 °C

SECTION 10: STABILITY AND REACTIVITY**10.1 Reactivity**

Reacts with strong mineral acids and strong oxidising materials.

10.2 Chemical stability

Stable under normal ambient and anticipated conditions of use.

10.3 Possibility of hazardous reactions

Hazardous reactions not anticipated under normal temperature and pressures.

10.4 Conditions to avoid

Can react with oxidising agents. Avoid strong acids.

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10.5 Incompatible materials

Strong mineral acids. Strong oxidizing materials.

10.6 Hazardous Decomposition products:

Decomposition product is Hydrogen Selenide gas.

SECTION 11: TOXICOLOGICAL INFORMATION**11.1 Information on toxicological effects****Acute toxicity:**

Toxic by ingestion and inhalation of dust, with a cumulative effect. Affects nervous system. Particular care must be exercised when machining and creating dust or particles. Inhalation of dust may irritate respiratory system.

Acute selenium poisoning produces central nervous system effects, which include nervousness, convulsions, and drowsiness. Other signs of intoxication can include skin eruptions, lassitude, gastrointestinal distress, teeth that are discolored or decayed, odorous ("garlic") breath, and partial loss of hair and nails.

Chronic exposure by inhalation can produce symptoms that include pallor, coating of the tongue, anemia, irritation of the mucosa, lumbar pain, liver and spleen damage, as well as any of the other previously mentioned symptoms. Chronic contact with selenium compounds may cause garlic odor of breath and sweat, dermatitis, and moderate emotional instability.

Product/ingredient name	Test	Species	Dose
Zinc Selenide	LD ₅₀ Oral	Rat	> 5000 mg/kg
	LD ₅₀ Dermal	Rabbit	No data available
	LD ₅₀ Inhalation	Rat	No data available
Thorium Fluoride	LD ₅₀ Oral	Rat	No data available
	LD ₅₀ Dermal	Rat	No data available
	LD ₅₀ Inhalation	Rat	No data available

Skin corrosion/irritation: Not expected to cause skin irritation or corrosion.**Serious eye damage/eye irritation:** Not expected to cause irritation or irreversible damage to the eye.**Respiratory or skin sensitisation:** Not expected to cause respiratory or skin .**Germ cell mutagenicity:** Not expected to cause germ cell mutagenicity.

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Carcinogenicity:	IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Zinc selenide).
Reproductive toxicity:	May cause harm to breast-fed children.
STOT - Single exposure:	Inhalation of dust may irritate respiratory system.
STOT - Repeat exposure:	May cause damage to organs through prolonged or repeated exposure.
Aspiration hazard:	Not expected to be an aspiration hazard.

SECTION 12: ECOLOGICAL INFORMATION**12.1 Toxicity:**

Danger to drinking water. Poisonous to Fish.

Substance name	Toxicity to fish / other aquatic invertebrates
Zinc selenide	No data available
Thorium Fluoride	No data available

12.2 Persistence and Degradability:

This product has not been tested for persistence or biodegradability.

12.3 Bioaccumulative potential:

No data available.

12.4 Mobility in soil:

No data available.

12.5 Results of PBT and vPvB assessment:

Not required or conducted.

12.6 Other adverse effects:

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Very toxic to aquatic life with long lasting effects. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways

SECTION 13: DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods:****Product**

Chemical residues are generally classified as special waste, and are covered by regulations which vary according to location. Contact your local waste disposal authority for advice, or pass to a chemical disposal company.

Contaminated packaging

Contaminated packaging may contain traces of the product and therefore should be disposed of in the same way as product.

SECTION 14: TRANSPORT INFORMATION**International transport regulations****14.1 UN number:**ADR/RID: UN 3283IMDG: UN 3283IATA: UN 3283**14.2 Proper shipping name:**ADR/RID: SELENIUM COMPOUND, SOLID, N.O.S. (ZINC SELENIDE).IMDG: SELENIUM COMPOUND, SOLID, N.O.S. (ZINC SELENIDE).IATA: SELENIUM COMPOUND, SOLID, N.O.S. (ZINC SELENIDE).**14.3 Transport hazard class(es)**ADR/RID: 6.1IMDG: 6.1IATA: 6.1**14.4 Packing group**ADR/RID: IIIIMDG: IIIIATA: III**Excepted quantity**ADR/RID: n/aIMDG: n/aIATA: n/a

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14.5 Environmental hazard

Marine Pollutant: Yes

14.6 Special precautions for user

No data available

14.7 Transport to bulk according to Annex II of MARPOL and the IBC Code

No data available

Section 15: REGULATORY INFORMATION**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

This safety datasheet complies with the requirements of:

EU Commission Regulation (EU) 2015/830 (Reach)

EU Regulation (EC) No 1272/2008 (CLP)

All ingredients are listed on the European Union chemical inventory.

15.2 Chemical safety assessment

For this product a chemical safety assessment was not carried out.

Section 16: OTHER INFORMATION**Indications of change:** New document.**Full text of H-Statements referred to under sections 2 and 3.**

H301 Toxic if swallowed.
H315 Causes skin irritation
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H335 May cause respiratory irritation
H361 Suspected of damaging fertility or the unborn child
H362 May cause harm to breast-fed children
H373 May cause damage to organs through prolonged or repeated exposure if swallowed.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

Full text of P-Statements referred to under sections 2 and 3.

P201 Obtain special instructions before use.
P260 Do not breathe dust/fume/gas/mist/ vapours/spray.
P261 Avoid breathing dust/fume/gas/mist/ vapours/spray.
P263 Avoid contact during pregnancy/while nursing.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well ventilated area.
P273 Avoid release to the environment.
P301+P310+P330 IF SWALLOWED: Immediately call a POISON CENTER /doctor. Rinse mouth.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308+P313 IF exposed or concerned: Get medical advice/attention.
P311 Call a POISON CENTER/doctor.

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- P321 Specific treatment (see section 4 to 8 of this SDS and any additional information on this label).
P391 Collect spillage.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
P501 Dispose of contents/containers to an approved disposal site in accordance with local/regional/national/international regulations.

Training advice: Before using/handling the product one must read carefully present SDS.

Abbreviations and acronyms:

- CAS: Chemical Abstracts Service (division of the American Chemical Society)
EH40: The official name for the occupational exposure limits document for the EU
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labeling of Chemicals
EC50: Half maximal effective concentration
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
M-factor: Multiplying factor used to calculate classifications
n/a: Not Applicable
SCL: Specific concentration limits.
STOT SE: Specific target organ toxicity - single exposure
STOT RE: Specific target organ toxicity - repeated exposure

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To the best of our knowledge the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.