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Medium Pressure Metal Halide Mercury and Iron Lamps

SAFETY DATA SHEET

Safety Overview

If a UV lamp breaks during handling and releases mercury, the following precautions should be observed to minimize the risk of exposure to mercury:

- Always wear gloves and safety glasses when handling or replacing a UV lamp.
- Leave the area immediately to avoid inhalation of the mercury vapor.
- Thoroughly ventilate the area for at least 30 minutes or until air monitoring confirms that the mercury vapour concentration complies with applicable federal and local health and safety regulations.
- After handling a broken UV lamp, carefully remove gloves, and then wash hands thoroughly with soap and water. Follow all applicable federal and local health, safety, and environmental regulations.
- Do not turn on or operate the system until all mercury contamination has been cleaned up and removed.
- Establish a Hazard Response Plan to deal with all related hazards and provide it to all personnel associated with the Atlantium system.

Refer the Chemical Safety information for mercury at:
http://www.inchem.org/documents/icsc/icsc/eics0056.htm

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

A safety data sheet is not required for this product under Article 31 of REACH. This safety data sheet has been created on a voluntary basis to communicate relevant information. Atlantium's innovative approach provides better performance and reduces the risk and uncertainty of conventional UV technology in five ways:

1.1 **Product identifier**

Product Name: Medium Pressure Metal Halide Mercury and iron lamps
Product Description: Ultraviolet lamps constructed from quartz containing small amounts of mercury, mercury halides, iron and metal halides

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture: UV lamps for curing printing inks, photo polymerisation and disinfection
Use advised against: For industrial use only

1.3 Details of the supplier of the safety data sheet

Name of Supplier: Atlantium Technologies Ltd.
Address of Supplier: Atlantium Technologies Ltd. POB 11071, Israel 9905511
Telephone: +972-2-992-5001
Email: support@atlantium.com

1.4 Emergency telephone number

Emergency Telephone: 1-800-596-2609

SECTION 2: Hazards identification

Exempt from the requirements of the CLP Regulation as the product is classed as an article.

2.1 Classification of the substance or mixture

- Classification (REGULATION (EC) No 1272/2008) [CLP/GHS]: Not applicable
- Additional information: For full text of Hazard- and EU Hazard-statements: see section 16

2.2 Label elements

Hazard pictograms: None
Signal Word: None
Hazard statements: None
Precautionary statements: None
Supplemental Hazard information (EU): None

2.3 Other hazards

There are no known hazards when the bulb is intact and not damaged. Exposure to product contents is highly unlikely during normal usage. Ozone (CAS 10028-15-6) may be formed during use. Ozone is under assessment as an endocrine disruptor. Ozone is an oxidiser and may cause or intensify fire. The principal health effects of ozone are produced by irritation and damage to the small airways of the lung. High concentrations of ozone may also cause severe irritation of the eyes. Ozone is also very toxic to aquatic life with long lasting effects. This product is designed to produce ultraviolet radiation. Exposure to UV Radiation in the UV-A / UV-C range is harmful to eyes and skin. The lamps may cause burns when hot. Mechanical destruction may cause harm by splinter of glass and liberation of the hazardous components. Inhalation of mercury vapors due to leakage or breakage of the lamp may be fatal, may cause organ damage through prolonged or repeated exposure, or may damage the unborn child. Mercury is also very toxic to aquatic life with long-lasting effects. Information on the hazards of the other components can be found in Sections 3.2 and 11.1.

SECTION 3: Composition/information on ingredients

3.2 Substances

- Not applicable

3.3 Mixtures

- This article does not contain any substances that are classed as SVHC
- Ozone (CAS 10028-15-6) may be formed during use
- The lamps may contain the following components:

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Chemical Name	Conc.	CAS No.	EC No.	Classification. (REGULATION (EC) No 1272/2008)[CLP/GHS]	SCL/M-Factor/ATE	REACH Registration Number	WEL/OEL
Quartz glass	-	14808-60-7	238-878-4	-	-	-	-
Mercury	up to 4 g, 0.5 g average	7439-97-6	231-106-7	Acute Tox. 2, H330 Repr. 1B, H360D STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 1, H410	-	Some uses of this substance are restricted under Annex XVII of REACH	Yes
Thorium dioxide	about 90 mg	1314-20-1	215-225-1	Acute Tox. 3, H301 Acute Tox. 3, H311 Acute Tox. 3, H331 Carc. 1B, H350	-	-	No
Dibarium calcium wolframate; Barium calcium tungsten oxide	about 70 mg	15552-14-4	239-606-7	Acute Tox. 4, H302 Acute Tox. 4, H332	-	-	No
Mercury diiodide	up to 50 mg	7774-29-0	231-873-8	Acute Tox. 2, H300. Acute Tox. 1, H310. Acute Tox. 2, H330. STOT RE 2, H373. Aquatic Acute 1, H400. Aquatic Chronic 1, H410	STOT RE 2 H373: C ≥ 0.1 %	Some uses of this substance are restricted under Annex XVII of REACH	Yes
Iron diiodide	up to 50 mg	7783-86-0	232-031-2	Acute Tox. 4, H302. Acute Tox. 4, H312. Skin Irrit. 2, H315. Eye Irrit. 2, H319. Acute Tox. 4, H332. STOT SE 3, H335. Repr. 1B, H360	-	-	Yes
Iron	up to 35 mg	7439-89-6	231-096-4	Not classified	-	-	No
Tin	up to 5 mg	7440-31-5	231-141-8	Not classified	-	-	Yes
Thallium bromide	up to 1 mg	7789-40-4	232-163-0	Acute Tox. 2, H300. Acute Tox. 2, H330. STOT RE 2, H373. Aquatic Chronic 2, H411	-	-	Yes

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SECTION 4: First aid measures

Burns caused by the lamp, ultra-violet radiation or ozone exposure or severe injuries caused by splinter of glass should be treated by a physician.
The following information is also of relevance if the lamp is broken and this results in direct contact with the hazardous components.
No action shall be taken involving any personal risk or without suitable training.
Rescuers should take suitable precautions to avoid becoming casualties themselves.

4.1 Description of first aid measures

Contact with eyes:
If substance has got into eyes, immediately wash out with plenty of water. Irrigate eyes thoroughly whilst lifting eyelids. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

Contact with skin:
Remove contaminated clothing immediately and drench affected skin with plenty of water. Then wash with soap and water. Get immediate medical advice/attention.

Ingestion:
Rinse mouth.
Do NOT induce vomiting.
Get immediate medical advice/attention.

Inhalation:

Remove person to fresh air and keep comfortable for breathing.

Keep warm and at rest, in a half upright position. Loosen clothing.

If unconscious, place person in recovery position.

If breathing is difficult, oxygen should only be administered by trained personnel.

Get immediate medical advice/attention.

4.2 Most important symptoms and effects, both acute and delayed

Contact with eyes:

During operation, UV lamps emit ultraviolet radiation and direct or reflected irradiation may be harmful to the eyes. Short term exposure will affect the cornea of the eyes causing irritation and/or conjunctivitis similar to "welder's burn". Long term exposure may cause possible blindness. Inhalation of ozone may cause eye irritation. Exposure to mercury vapour may lead to conjunctivitis and ocular irritation. The eyes may develop grey or brown lens discolouration. Blurred vision, photophobia and reduction of the visual field are also possible. Iron diiodide is irritating to eyes.

Contact with skin:

During operation, UV lamps emit ultraviolet radiation and direct or reflected irradiation may be harmful to the skin. Short term exposure can evoke erythema to the skin and long term exposure may cause severe skin burns. Discoid eczema, hyperhidrosis, skin erythema and pruritis can develop following dermal exposure to elemental mercury. Thorium dioxide is toxic in contact with skin. Barium calcium tungsten oxide is harmful in contact with skin. Inorganic mercury compounds are fatal in contact with skin. Iron diiodide is harmful and irritating to skin. Cutaneous effects of thallium exposure may include dry, scaly skin and impairment of nail growth often resulting in the appearance of crescent-shaped strips across fingernails and toenails (Mees' line).

Ingestion:

Elemental mercury is poorly absorbed from the gastrointestinal tract and is therefore unlikely to cause serious adverse health effects following ingestion. If large amounts of elemental mercury are ingested, patients may develop nausea, vomiting and abdominal pain. Aspiration of mercury is likely during substantial ingestion. Features similar to those seen following inhalation of mercury vapour may follow. Thorium dioxide is toxic if swallowed. Barium calcium tungsten oxide is harmful if swallowed. Inorganic mercury compounds are fatal if swallowed. Iron diiodide is harmful if swallowed. Iron and tin are not regarded as toxic but excessive exposure can cause fever, nausea, stomach cramps or diarrhoea. Thallium bromide is fatal if swallowed. Acute poisoning results in swelling of the feet and legs, arthralgia, vomiting, insomnia, hyperesthesia and paresthesia of the hands and feet, mental confusion, polyneuritis with severe pain in the legs and loins, partial paralysis of the legs, angina-like pains, nephritis, wasting and weakness, and

lymphocytosis and eosinophilia. In chronic poisoning, central and peripheral nervous system abnormalities may persist including ataxia, tremor, incoordination, paralysis of extremities, endocrine disorders, memory loss, and psychoses may develop.

Inhalation:

UV lamps may emit short-wave radiation causing ozone to be emitted. If headache, shortness of breath or heavy chest symptoms occur, remove the affected person to fresh air and provide supplemental oxygen treatmgment as needed. Inhalation of ozone may irritate the nose and lungs or cause nausea and headache. High concentrations of ozone may cause severe irritation of the eyes. Large amounts of mercury vapour in the air can cause effects such as cough, breathing difficulties and chest tightness; lung and airway damage may develop in severe cases. It can also affect the nervous system, causing effects such as tremor, irritability, nervousness, memory loss, hallucinations, muscle changes and headaches. Effects on the kidneys, mouth, stomach and skin may also arise. Inorganic mercury compounds are fatal if inhaled. Inhalation exposure to elemental mercury and mercury compounds over a long period of time can have an effect on the central nervous system. Symptoms include personality changes, insomnia, memory loss, poor concentration, headache, speech problems, blurred vision, tremors and muscle weakness. Thorium dioxide is toxic if inhaled. Iron diiodide is harmful and irritating to the respiratory system. Long term inhalation exposure to iron (oxide fume or dust) can cause siderosis. Siderosis is considered to be a benign pneumoconiosis and does not normally cause significant physiologic impairment. Siderosis can be observed on X-rays with the lungs having a mottled appearance. Thallium bromide is fatal if inhaled. The most characteristic symptom of thallium exposure is alopecia (loss of hair). Iodides have been known to cause cough, wheezing, laryngitis, shortness of breath, headache, nausea, vomiting.Indication of any immediate medical attention and special treatment needed

4.3 Extinguishing media

Symptoms of poisoning may occur even after several hours; therefore provide medical observation for at least 48 hours after the accident.

SECTION 5: Firefighting measures

5.1 Indication of any immediate medical attention and special treatment needed.

Suitable extinguishing media: Not flammable.
In case of fire use extinguishing media appropriate to surrounding conditions.

Product Description: No additional product-specific fire behaviour information available.

5.2. Special hazards arising from the substance or mixture.

- Smoke from fires is toxic. Take precautions to protect personnel from exposure
- Decomposition products may include mercury vapour, barium oxide, calcium oxide, tungsten oxide, iodine, hydrogen iodide, hydrogen bromide, thallium oxides

5.3 Advice for firefighters

- Special protective equipment: Wear self-contained breathing apparatus (SCBA). Wear full protective clothing including chemical protection suit.
- Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Prevent fire extinguishing water from contaminating surface or ground water.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Rescuers should take suitable precautions to avoid becoming casualties themselves
- Personal precautions for non-emergency personnel: Do not touch or walk through spilt material; Do not breathe vapour; Do not get in eyes, on skin, or on clothing
- Personal precautions for emergency responders: Evacuate the area and keep personnel upwind. Wear protective clothing as specified in Section 8.

6.2 Environmental precautions

- Do not allow to enter public sewers and watercourses
- Do not allow to penetrate the ground/soil

6.3 Methods and material for containment and cleaning up

- If the lamp is mechanically destroyed amounts of mercury can be liberated
- If the lamp is broken, treat all quartz shards as contaminated with mercury and other hazardous components
- Mercury, and, any materials that contain mercury, should be disposed of in accordance with national waste disposal regulations
- Evacuate the area and keep personnel upwind
- Do not touch or walk through spilt material
- Wear protective clothing as per section 8
- Small spills
  Droplets of mercury should be collected with special mercury pads.
  Keep the collected mercury in an air-tight sealable plastic container.
  It is recommended to use a specialist mercury spill kit.
  Clean up the decontaminated surfaces with wet cleaning rags.
  Remove contaminated material to safe location for subsequent disposal

- Large spills
  For large spills, cover with sulphur powder (a special mercury absorber) to bind the mercury and put it in an air-tight sealable plastic container.
  Seal containers and label them.
  Remove contaminated material to safe location for subsequent disposal.

- Wash spill site with water and detergent.
  Wash thoroughly after dealing with spillage.

6.4 Reference to other sections

- See section(s): 7, 8 &13

SECTION 7: Handling and storage

7.1 Precautions for safe handling

- Avoid mechanical stress (risk of broken glass)
- Avoid touching the lamp with bare hands, always wear gloves while handling lamps
- Clean the lamp body with an alcohol wipe such as isopropyl alcohol before use
- Some lamps (ozone producing types), in addition to producing ultraviolet rays, will also produce ozone when operated in air. Care should be exercised in the design and installation of equipment so that ozone concentration will not exceed 0.05 ppm in areas occupied by people
- Provide adequate ventilation in all areas where equipment utilizing ozone-producing lamps is employed
- Avoid breathing vapours, mist or gas

7.2 Conditions for safe storage, including any incompatibilities

- No special precautions are required for this product

7.3 Specific end use(s)

- For emitting ultraviolet radiation

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

- If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace exposure – Measurement of exposure by inhalation to chemical agents – Strategy for testing compliance with occupational exposure limit values). European Standard EN 14042 (Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents). European Standard EN 482 (Workplace exposure. General requirements for the performance of procedures for the measurement of chemical agents). Reference to national guidance documents for methods for the determination of hazardous substances will also be required

- Ozone may be formed during use

Ozone

WEL (short term) 0.2 ppm 0.4 mg/m³ (UK)
(USA) OSHA PEL (TWA) 0.1 ppm 0.2 mg/m³
(USA) NIOSH REL (Ceiling Limit) 0.1 ppm 0.2 mg/m³
TLV (Threshold Limit Value established by ACGIH): 0.05 – 0.20 ppm (depending on workload and time)
DNEL (inhalational) 24 µg/m³ Industry, Long Term, Local Effects
PNEC aqua (freshwater) 8 ng/L

PNEC aqua (intermittent releases, freshwater) 80 ng/L
PNEC aqua (marine water) 0.8 ng/L
PNEC aqua (intermittent releases, marine water) 8 ng/L

Mercury

(EU) OELV (long term TWA) 0.02 mg/m³
WEL (long term) 0.02 mg/m³ (UK. Mercury and its compounds, inorganic divalent)
BMGV (Biological Monitoring Guidance Value) (UK) 20 µmol mercury/mol creatinine in urine. Sampling Time: Random
(USA) OSHA PEL (Acceptable Ceiling Concentration) 0.1 mg/m³ (Mercury and its compounds)
(USA) NIOSH REL (TWA) 0.05 mg/m³ (Mercury compounds, Hg Vapor) [skin]
(USA) NIOSH REL (Ceiling Limit) 0.1 mg/m³ (Mercury compounds, as Hg) [skin]
TLV (Threshold Limit Value established by ACGIH): 8-hour TWA 0.025 mg/m³ (elemental and inorganic)
DNEL (inhalational) 20 µg/m³ Industry, Long Term, Systemic Effects
DNEL (inhalational) 4 µg/m³ Consumer, Long Term, Systemic Effects
DNEL (oral) 7.39 µg/kg (bw/day) Consumer, Long Term, Systemic Effects
PNEC aqua (freshwater) 57.4 ng/L
PNEC aqua (marine water) 67.2 ng/L
PNEC (STP) 2.25 µg/L
PNEC sediment (freshwater) 9.3 mg/kg
PNEC sediment (marine water) 9.3 mg/kg
PNEC terrestrial (soil) 22 µg/kg

Thorium dioxide

No exposure limits have been set for this substance
Radiation Dose Limits may apply
Dibarium calcium wolframate; Barium calcium tungsten oxide
No exposure limits have been set for this substance

Mercury diiodide

(EU) OELV (long term TWA) 0.02 mg/m³
WEL (long term) 0.02 mg/m³ (UK. Mercury and its compounds, inorganic divalent)
BMGV (Biological Monitoring Guidance Value) (UK) 20 µmol mercury/mol creatinine in

urine.Sampling Time: Random
(USA) OSHA PEL (Acceptable Ceiling Concentration) 0.1 mg/m³ (Mercury and its compounds)
(USA) NIOSH REL (TWA) 0.05 mg/m³ (Mercury compounds, Hg Vapor) [skin]
(USA) NIOSH REL (Ceiling Limit) 0.1 mg/m³ (Mercury compounds, as Hg) [skin]
TLV (Threshold Limit Value established by ACGIH): 8-hour TWA 0.025 mg/m³ (elemental and inorganic)

Iron diiodide

WEL (long term) 1 mg/m³ (UK; Iron salts, as Fe)
WEL (short term) 2 mg/m³ (UK; Iron salts, as Fe)
(USA) NIOSH REL (TWA) (Iron salts, as Fe) 1 mg/m³

Iron

DNEL (inhalational) 3 mg/m³ Industry, Long Term, Local Effects
DNEL (inhalational) 1.5 mg/m³ Consumer, Long Term, Local Effects
DNEL (oral) 700 µg/kg (bw/day) Consumer, Long Term, Systemic Effects

Tin

WEL (long term) 2 mg/m³ (UK. Tin compounds, inorganic, except SnH4)
WEL (short term) 4 mg/m³ (UK. Tin compounds, inorganic, except SnH4)
(USA) OSHA PEL (TWA) (Tin compounds, inorganic, except oxides) 2 mg/m³
(USA) NIOSH REL (TWA) (Tin compounds, inorganic, except oxides) 2 mg/m³

DNEL (inhalational) 71 mg/m³ Industry, Long Term, Systemic Effects
DNEL (dermal) 10 mg/kg (bw/day) Industry, Long Term, Systemic Effects
DNEL (inhalational) 17 mg/m³ Consumer, Long Term, Systemic Effects
DNEL (dermal) 80 mg/kg (bw/day) Industry, Long Term, Systemic Effects
DNEL (oral) 5 mg/kg (bw/day) Consumer, Long Term, Systemic Effects

Thallium bromide

WEL (long term) 0.1 mg/m³ (UK. Thallium, soluble compounds, as Tl)
(USA) OSHA PEL (TWA) (Thallium and compounds, as Tl) 0.1 mg/m³ [skin]
(USA) NIOSH REL (TWA) (Thallium and compounds, as Tl) 0.1 mg/m³ [skin]

8.2 Exposure controls

- Selection and use of personal protective equipment should be based on a risk assessment of exposure potential

- **Engineering controls**
  Ensure adequate ventilation.
  Ozone generated by the process requires negative pressure exhaust ventilation and should be prevented from entering the workroom air by the use of exhaust appliances placed close to the source of emission.

- **Respiratory protection**
  None required for normal handling of product.
  If mercury is liberated and ventilation of the working place is not sufficient use filter with combination Hg-P3.

- **Skin protection**
  If glass is broken, use cut resistant gloves.
  The selection of a suitable glove depends on work conditions and whether the product is present on its own or in combination with other substances. Breakthrough time is dependent on the characteristics of the brand of glove used and the supplier should be consulted. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and standard EN 374.

- **Eye/face protection**
  Wear eye protection if exposure to UV-radiation is possible

- **Thermal hazards**
  Wear heat insulating gloves when handling the lamp when hot to prevent thermal burns

- **Hygiene measures**
  Use good personal hygiene practices.
  Contaminated work clothing should not be allowed out of the workplace.
  Contaminated clothing should be laundered before reuse.

- **Environmental exposure controls**
  Avoid release to the environment.
  Do not allow to penetrate the ground/soil.

SECTION 9: Exposure controls/personal protection

9.1 Information on basic physical and chemical properties

- **Physical state:** Solid (article). Glass lamp (quartz envelope containing mercury with metal halide and other additives)
- **Colour:** Colourless
- **Melting point/freezing point:** Quartz glass 2000 °C Mercury is liquid at room temperature
- **Boiling point or initial boiling point and boiling range:** Not applicable
- **Flammability:** Not flammable
- **Lower and upper explosion limit:** Not applicable
- **Flash point:** Not applicable
- **Auto-ignition temperature:** Not applicable
- **Decomposition temperature:** Not applicable
- **pH:** Not applicable
- **Kinematic viscosity:** Not applicable
- **Solubility:** Not applicable

- **Partition coefficient n-octanol/water (log value):** Not applicable
- **Vapour pressure:** 0.002 mmHg at 25 °C (mercury)
- **Density and/or relative density:** Not applicable
- **Relative vapour density:** Not applicable
- **Particle characteristics:** Not applicable

9.2 Other Information: Ozone is an oxidiser and may cause or intensify fire.

SECTION 10: Stability and reactivity

10.1 **Reactivity:** No information available

10.2 **Chemical stability:** Considered stable under normal conditions

10.3 **Possibility of hazardous reactions:** No information available

10.4 **Conditions to avoid:** Mechanical stress may cause broken glass (danger of broken glass and liberated mercury)

10.5 **Incompatible materials:** No information available

10.6 **Hazardous decomposition products:**

- Decomposition products may include mercury vapour, barium oxide, calcium oxide, tungsten oxide, iodine, hydrogen iodide, hydrogen bromide, thallium oxides
- Ozone may be formed during use

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SECTION 11: Toxicological information

The lamp components are fully sealed and enclosed in a quartz envelope. There are no known health effects during normal handling of the lamp.This section applies to the damaged product e.g. leaking mercury.

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute Toxicity

	Substances			
Chemical Name	LD_{50} (oral, rat).	LD_{50} (inhalation, rat)	LD_{50} (dermal, rabbit)	Remarks
Ozone	No data available	14808-60-7	238-878-4	-
Mercury	9.2 - 105 mg/kg	7439-97-6	231-106-7	Acute Tox. 2, H330 Repr. 1B, H360D STOT RE 1, H372
Thorium dioxide	No data available	1314-20-1	215-225-1	Acute Tox. 3, H301 Acute Tox. 3, H311 Acute Tox. 3,
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available	15552-14-4	239-606-7	Acute Tox. 4, H3
Mercury diiodide	No data available	7774-29-0	231-873-8	Acute Tox. 2, H300 Acute
Iron diiodide	No data available	7783-86-0	232-031-2	Acute Tox. 4, H302 Acute
Iron	7 500 mg/kg	7439-89-6	231-096-4	Not classified
Tin	2 000 mg/kg	7440-31-5	231-141-8	Not classified
Thallium bromide	No data available	7789-40-4	232-163-0	Acute Tox. 2, H300 Acute

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Skin corrosion/irritation substances

	Substances
Chemical Name	Irritation/corrosion
Ozone	Adverse effect observed (corrosive)
Mercury	No adverse effect observed (not irritating)
Thorium dioxide	No data available
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available
Mercury diiodide	No data available
Iron diiodide	Adverse effect observed (irritating)
Iron	No adverse effect observed (not irritating)
Tin	No adverse effect observed (not irritating)
Thallium bromide	No data available

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Serious eye damage/irritation

	Substances
Chemical Name	Irritation/corrosion
Ozone	Adverse effect observed (corrosive)
Mercury	No adverse effect observed (not irritating)
Thorium dioxide	No data available
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available
Mercury diiodide	No data available
Iron diiodide	Adverse effect observed (irritating)
Iron	No adverse effect observed (not irritating)
Tin	No adverse effect observed (not irritating)
Thallium bromide	No data available

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Respiratory or skin sensitization

	Substances	
Chemical Name	Respiratory sensitisation	Skin sensitisation
Ozone	No adverse effect observed (not sensitising)	No adverse effect observed (not sensitising)
Mercury	No data available	No adverse effect observed (not sensitising)
Thorium dioxide	No data available	No data available
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available	No data available
Mercury diiodide	No data available	No data available
Iron diiodide	No data available	No data available
Iron	No adverse effect observed (not sensitising)	No adverse effect observed (not sensitising)
Tin	No adverse effect observed (not sensitising)	No adverse effect observed (not sensitising)
Thallium bromide	No data available	No data available

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Germ cell mutagenicity

	Substances	
Chemical Name	Toxicity - In Vitro	S Toxicity - In Vivo
Ozone	No adverse effect observed (negative)	No adverse effect observed (negative)
Mercury	No data available	No data available
Thorium dioxide	No data available	No data available
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available	No data available
Mercury diiodide	No data available	No data available
Iron diiodide	No data available	No data available
Iron	No data available	No data available
Tin	No adverse effect observed (negative)	No data available
Thallium bromide	No data available	No data available

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Carcinogenicity

	Substances			
Chemical Name	NOAEL (oral, rat)	NOAEC (inhalation, rat)	NOAEL (dermal, rat)	Remarks
Ozone	No data available	1 mg/m³	No data available	No evidence of carcinogenic effects
Mercury	No data available	No data available	No data available	Mercury is classified by IARC as Group 3 (Not classifiable as to its carcinogenicity to humans)
Thorium dioxide	No data available	No data available	No data available	Thorium dioxide is classified by IARC as Group 1 (Carcinogenic to humans)
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available	No data available	No data available	No evidence of carcinogenic effects
Mercury diiodide	No data available	No data available	No data available	Inorganic mercury compounds are classified by IARC as Group 3 (Not classifiable as to its carcinogenicity to humans)
Iron diiodide	No data available	No data available	No data available	No evidence of carcinogenic effects
Iron	No data available	No data available	No data available	No evidence of carcinogenic effects
Tin	No data available	No data available	No data available	No evidence of carcinogenic effects
Thallium bromide	No data available	No data available	No data available	No evidence of carcinogenic effects

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Reproductive toxicity

	Substances			
Chemical Name	NOAEL (oral, rat)	NOAEC (inhalation, rat)	NOAEL (dermal, rat)	Remarks
Ozone	No data available	1.57 mg/m³ (Effect on developmental toxicity)	No data available	No evidence of reproductive effects
Mercury	No data available	No data available	No data available	Repr. 1B, H360D
Thorium dioxide	No data available	No data available	No data available	No evidence of reproductive effects
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available	No data available	No data available	No evidence of carcinogenic effects
Mercury diiodide	No data available	No data available	No data available	No evidence of reproductive effects
Iron diiodide	No data available	No data available	No data available	Repr. 1B, H360
Iron	No data available	No data available	No data available	No evidence of reproductive effects
Tin	1 000 mg/kg bw/day	No data available	No data available	No evidence of reproductive effects
Thallium bromide	No data available	No data available	No data available	No evidence of reproductive effects

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Specific target organ toxicity (STOT) - single exposure

	Substances
Chemical Name	Remarks
Ozone	May cause irritation to nose and lungs
Mercury	No data available
Thorium dioxide	No data available
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available
Mercury diiodide	No data available
Iron diiodide	STOT SE 3, H335
Iron	No data available
Tin	No data available
Thallium bromide	No data available

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Specific target organ toxicity (STOT) – repeated exposure

	Substances			
Chemical Name	NOAEL (oral, rat)	NOAEC (inhalation, rat)	NOAEL (dermal, rat)	Remarks
Ozone	No data available	235 µg/m³	No data available	No data available
Mercury	LOAEL 0.312 - 2.5 mg/kg bw/day	No data available	No data available	STOT RE 1, H372
Thorium dioxide	No data available	No data available	No data available	No data available
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available	No data available	No data available	No data available
Mercury diiodide	No data available	No data available	No data available	STOT RE 2 *, H373 **
Iron diiodide	No data available	No data available	No data available	No data available
Iron	LOAEL 26 mg/kg bw/day	5 mg/m³	No data available	No data available
Tin	1 000 mg/kg bw/day	No data available	No data available	No data available
Thallium bromide	No data available	No data available	No data available	STOT RE 2 *, H373 **

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Aspiration hazard
No information available

Contact with eyes
During operation, UV lamps emit ultraviolet radiation and direct or reflected irradiation may be harmful to the eyes. Short term exposure will affect the cornea of the eyes causing irritation and/or conjunctivitis similar to "welder's burn". Long term exposure may cause possible blindness. Inhalation of ozone may cause eye irritation. Exposure to mercury vapour may lead to conjunctivitis and ocular irritation. The eyes may develop grey or brown lens discolouration. Blurred vision, photophobia and reduction of the visual field are also possible. Iron diiodide is irritating to eyes.

Contact with skin
During operation, UV lamps emit ultraviolet radiation and direct or reflected irradiation may be harmful to the skin. Short term exposure can evoke erythema to the skin and long term exposure may cause severe skin burns. Discoid eczema, hyperhidrosis, skin erythema and pruritis can develop following dermal exposure to elemental mercury. Thorium dioxide is toxic in contact with skin. Barium calcium tungsten oxide is harmful in contact with skin. Inorganic mercury compounds are fatal in contact with skin. Iron diiodide is harmful and irritating to skin. Cutaneous effects of thallium exposure may include dry, scaly skin and impairment of nail growth often resulting in the appearance of crescent-shaped strips across fingernails and toenails (Mees' line).

Ingestion
Elemental mercury is poorly absorbed from the gastrointestinal tract and is therefore unlikely to cause serious adverse health effects following ingestion. If large amounts of elemental mercury are ingested, patients may develop nausea, vomiting and abdominal pain Aspiration of mercury is likely during substantial ingestion. Features similar to those seen following inhalation of mercury vapour may follow. Thorium dioxide is toxic if swallowed. Barium calcium tungsten oxide is harmful if swallowed. Inorganic mercury compounds are fatal if swallowed. Iron diiodide is harmful if swallowed. Iron and tin are not regarded as toxic but excessive exposure can cause fever, nausea, stomach cramps or diarrhoea. Thallium bromide is fatal if swallowed. Acute poisoning results in swelling of the feet and legs, arthralgia, vomiting, insomnia, hyperesthesia and paresthesia of the hands and feet, mental confusion, polyneuritis with severe pain in the legs and loins, partial paralysis of the legs, angina-like pains, nephritis, wasting and weakness, and lymphocytosis and eosinophilia. In chronic poisoning, central and peripheral nervous system abnormalities may persist including ataxia, tremor, incoordination, paralysis of extremities, endocrine disorders, memory loss, and psychoses may develop.

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Inhalation

UV lamps may emit short-wave radiation causing ozone to be emitted. If headache, shortness of breath or heavy chest symptoms occur, remove the affected person to fresh air and provide supplemental oxygen treatment as needed. Inhalation of ozone may irritate the nose and lungs or cause nausea and headache. High concentrations of ozone may cause severe irritation of the eyes. Large amounts of mercury vapour in the air can cause effects such as cough, breathing difficulties and chest tightness; lung and airway damage may develop in severe cases. It can also affect the nervous system, causing effects such as tremor, irritability, nervousness, memory loss, hallucinations, muscle changes and headaches. Effects on the kidneys, mouth, stomach and skin may also arise. Inorganic mercury compounds are fatal if inhaled. Inhalation exposure to elemental mercury and mercury compounds over a long period of time can have an effect on the central nervous system. Symptoms include personality changes, insomnia, memory loss, poor concentration, headache, speech problems, blurred vision, tremors and muscle weakness. Thorium dioxide is toxic if inhaled. Iron diiodide is harmful and irritating to the respiratory system. Long term inhalation exposure to iron (oxide fume or dust) can cause siderosis. Siderosis is considered to be a benign pneumoconiosis and does not normally cause significant physiologic impairment. Siderosis can be observed on X-rays with the lungs having a mottled appearance. Thallium bromide is fatal if inhaled. The most characteristic symptom of thallium exposure is alopecia (loss of hair). Iodides have been known to cause cough, wheezing, laryngitis, shortness of breath, headache, nausea, vomiting.

11.2 Information of other Hazards

- Ozone is being assessed for endocrine disrupting properties

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SECTION 12: Ecological information

The lamp components are fully sealed and enclosed in a quartz envelope. This section applies to the damaged product e.g. leaking mercury. Mercury and inorganic mercury compounds are very toxic to aquatic life with long-lasting effects. Thallium compounds are toxic to aquatic life with long lasting effects.

12.1 Toxicity

	Substances		
Chemical Name	LC (fish)	EC (aquatic invertebrates)	EC (aquatic algae)
Mercury	(4 days) 26 - 1 210 µg/L	(72 h) 14 - 51.4 µg/L	(4 days) 9 µg/L
Thorium dioxide	No data available	No data available	No data available
Dibarium calcium wolframate; Barium calcium tungsten oxide	No data available	No data available	No data available
Mercury diiodide	No data available	No data available	No data available
Iron diiodide	No data available	No data available	No data available
Iron	No data available	No data available	No data available
Tin	(4 days) 12.4 µg/L	No data available	(72 h) 19.2 µg/L
Thallium bromide	No data available	No data available	No data available

12.2 Mobility in soil

- No information available

12.3 Persistence and degradability

- Not applicable, inorganic

12.4 Bioaccumulative potential

- No information available

12.5 Mobility in soil

- Not a PBT according to REACH Annex XIII
- Not a vPvB according to REACH Annex XIII

12.6 Endocrine disrupting properties

- Ozone is being assessed for endocrine disrupting properties

12.7 Other adverse effects

- Avoid release to the environment
- Do not allow to penetrate the ground/soil

SECTION 13: Disposal considerations

13.1 Waste treatment methods

- Disposal should be in accordance with local, state or national legislation
- The Waste Electrical and Electronic Equipment (WEEE) Regulations apply in the UK
- Refer to manufacturer/supplier for information on recovery/recycling

13.2 Classification

- The waste must be identified according to the List of Wastes (2000/532/EC)
- EWC Code: 20 01 21* fluorescent tubes and other mercury-containing waste

SECTION 14: Transport information

14.1 UN number or ID number

- UN No.: 3506

14.2 UN proper shipping name

- Proper Shipping Name: MERCURY CONTAINED IN MANUFACTURED ARTICLES

14.3 Transport hazard class(es)

- Hazard Class: 8 (6.1)

14.4 Packing group

- Packing Group: Not applicable

14.5 Environmental hazards

- Not applicable

14.6 Special precautions for user

- No special precautions are required for this product

14.7 Maritime transport in bulk according to IMO instruments

- Not applicable

14.8 Road/Rail (ADR/RID)

- Proper Shipping Name: MERCURY CONTAINED IN MANUFACTURED ARTICLES
- ADR UN No.: 3506
- ADR Hazard Class: 8 (6.1)
- ADR Packing Group: Not applicable
- Tunnel Code: (E)
- Special Provision(s): 366 - Manufactured instruments and articles containing not more than 1 kg of mercury are not subject to ADR.See also ADR 1.1.3.10

14.9 Sea (IMDG)

- Proper Shipping Name: MERCURY CONTAINED IN MANUFACTURED ARTICLES
- IMDG UN No.: 3506
- IMDG Hazard Class: 8 (6.1)
- IMDG Packing Group: Not applicable

- Special Provision(s): 366 - Manufactured instruments and articles containing not more than 1 kg of mercury are not subject to the provisions of this Code. See also IMDG 1.1.1.9

14.10 Air (ICAO/IATA)

- Proper Shipping Name: MERCURY CONTAINED IN MANUFACTURED ARTICLES
- ICAO UN No.: 3506
- IMDG Hazard Class: 8 (6.1)
- IMDG Packing Group: Not applicable
- Special Provision(s): 366 - 1.2.11 Lamps Containing Dangerous Goods. The following lamps are not subject to these Regulations provided that they do not contain radioactive material: (a) lamps each containing not more than 1 g of dangerous goods and packaged so that there is not more than 30 g of dangerous goods per package, provided that: 1. the lamps are certified to a manufacturer's quality management system; and 2. each lamp is either individually packed in inner packagings, separated by dividers, or surrounded with cushioning material to protect the lamps and packed into strong outer packagings meeting the general provisions of 5.0.2.4.1 and capable of passing a 1.2 m drop test. IATA A191 - Notwithstanding the Division 6.1 subsidiary hazard shown in column C of Table 4.2, the toxic subsidiary hazard label and an indication of this subsidiary hazard on the Shipper's Declaration are not required when the manufactured articles contain not more than 5 kg of mercury. Transport in accordance with this special provision must be noted on the Shipper's Declaration.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

- This safety data sheet is provided in compliance with REACH Regulation (EC) No 1907/2006 (as amended by Regulation (EU) 2020/878) and UK REACH
- A safety data sheet is not required for this product under Article 31 of REACH. This safety data sheet has been created on a voluntary basis to communicate relevant information
- The GB Classification, Labelling and Packaging Regulation (GB CLP) applies in Great Britain
- Regulation (EC) No. 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP Regulation) applies in Europe
- Exempt from the requirements of the CLP Regulation as the product is classed as an article, Information is provided to inform users of the hazards associated with the use of the product
- Restrictions on use according to Annex XVII to REACH Regulation: Entry 18 - Mercury compounds; Entry 18a - Mercury, CAS No 7439-97-6, EC No 231-106-7
- This product is in compliance with the EU Restriction of Hazardous Substances (RoHS) requirements
- The Waste Electrical and Electronic Equipment (WEEE) Regulations apply in the UK

15.2 Chemical safety assessment

- A chemical safety assessment is not required under REACH

SECTION 16: Other information

The above information is believed to be correct but does not purport to be all inclusive and shall only be used as a guide. The company will not be held liable for any damage resulting from handling or from contact with this product. Sources of data: Information from published literature and company data Revision No. 1.1.0. Revised May 2025. Changes made: Addition of IATA special provision A191 in subsection 14.10.
Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]: Not applicable.

Text not given with phrase codes where they are used elsewhere in this safety data sheet:

- H301: Toxic if swallowed
- H302: Harmful if swallowed
- H311: Toxic in contact with skin
- H312: Harmful in contact with skin
- H315: Causes skin irritation
- H319: Causes serious eye irritation
- H330: Fatal if inhaled
- H331: Toxic if inhaled
- H332: Harmful if inhaled
- H335: May cause respiratory irritation
- H350: May cause cancer
- H360: May damage fertility or the unborn child
- H360D: May damage the unborn child
- H372: Causes damage to organs through prolonged or repeated exposure

- H400: Very toxic to aquatic life
- H410: Very toxic to aquatic life with long lasting effects

Acronyms

- ATE: Acute Toxicity Estimate
- CAS: Chemical Abstracts Service
- EC: European Community
- EC_{50}: Effective Concentration, 50%
- GHS: Globally Harmonised System
- IARC: International Agency for Research on Cancer
- LC_{50}: Lethal Concentration, 50%
- LD_{50}: Lethal Dose, 50%
- LOAEL: Lowest Observed Adverse Effect Level
- NOAEC: No Observed Adverse Effect Concentration
- NOAEL: No Observed Adverse Effect Level
- OEL: Occupational Exposure Limit

  PBT: Persistent, Bioaccumulative and Toxic
- REACH: Registration, Evaluation, Authorisation and Restriction of Chemicals
- SCL: Specific Concentration Limit
- SVHC: Substances of Very High Concern
- vPvB: very Persistent and very Bioaccumulative
- WEL: Workplace Exposure Limit