

# Electronic Initiating Unit

## Material Safety Data Sheet

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Electronic Initiating Unit (EIU)  
Company Address: P O Box 10, Modderfontein, 1645, Gauteng, Rep. of South Africa

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

**Explosive Ingredients:** Fusehead Composition

**Other Ingredients:** Glass, ink, resin, silicon, tantalum, ceramic, copper, gold, Santoprene, Arnite, polypropylene, nickel, chromium.

Chemical Name	CAS No.	%	EC Number	Classification
Lead Compounds	7439-92-1	<2	231-100-4	Repr. Cat. 1;R61 Repr. Cat. 3;R62 Xn; R20/22 R33 N; R50/53  See section 16 for the full text of the R phrases declared above

**Recommended use:** A 2-wire or 4-wire electronic initiating unit, intended for use in the manufacturing of all types of 3G electronic detonators. The unit consists of a populated printed circuit board (PCB) with a low energy monofoil-type electric fusehead soldered to the PCB. The fuseheads sole application is to provide the initiating portion for 3G electronic Detonators.

### 3. HAZARDS IDENTIFICATION

The preparation is classified as dangerous according to Directive 1999/45/ED and its amendments.

Classification: E; R2

Additional Hazards: After detonation, dust and fumes may be harmful by inhalation on repeated exposure (lead poisoning).

Effects and symptoms:

Pre-use:	Handle with extreme care – the material is an explosive and at temperatures above 90° C, the product may spontaneously explode. Keep away from sparks and naked flames, impact, friction, stray electrical currents and heat. Wear the necessary protective equipment when handling the material and its components.
Post-use:	Minimal exposure risk is expected, as quantities of hazardous components used are small.

Effects and symptoms of exposure to lead:

Acute: Metallic taste, abdominal pain, vomiting, diarrhoea, collapse and coma

Chronic: Loss of appetite, weight loss, lead line on gums, constipation, apathy or irritability, metallic taste, headaches

**Aggravating conditions:** None identified

For more details on the toxicological properties of the hazardous components, see Section 11.

### 4. FIRST AID MEASURES

In case of burns, cool the affected area for as long as possible with cold water. Seek immediate medical assistance. If the burns appear to be serious, keep patient warm and provide reassurance.

**Inhalation:** Pre-use: Hazardous materials are encapsulated; no exposure during normal handling is therefore expected.  
Post-use: Minimal exposure risk is expected as quantities of hazardous components used are small.

**Ingestion:** Do not induce vomiting but obtain medical attention.

**Eye Contact:** Irrigate with clean water holding the eyelids apart for at least 20 minutes then obtain medical attention

**Skin Contact:** Not the normal route of entry but wash the skin with soap and water then obtain medical attention.

**Notes to physician:** No specific treatment. Treat symptomatically

## 5. FIRE FIGHTING MEASURES

### **DO NOT FIGHT FIRES INVOLVING EXPLOSIVES.**

**Specific hazards:** Explodes when exposed to heat.

**Hazardous thermal decomposition products:** Lead compounds, carbon oxides (CO, CO<sub>2</sub>) nitrogen oxides (NO, NO<sub>2</sub>).

**Special fire-fighting procedures:** If there is a fire, promptly isolate the scene by removing all persons from the vicinity of the incident. First move people out of line-of-sight of the scene and away from windows. When controlling fire before involvement of explosives, fire fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear. Fire fighters' protective clothing will provide limited protection. **DO NOT FIGHT FIRE WHEN IT REACHES MATERIAL.** Withdraw from fire and let it burn.

## 6. ACCIDENTAL RELEASE MEASURES

Shut off all possible sources of ignition. Evacuate the area and then inform the relevant Authorities or responsible person immediately. In the case of a transport accident, notify the local Authorities/Police Station, the transporting company and supplier. Refer to section 18 for emergency numbers.

**Note: See Section 8 for personal protective clothing and Section 12 for waste disposal.**

## 7. HANDLING AND STORAGE

**Handling:** Keep locked up. Keep away from sources of ignition. Keep away from all sources of electrostatic discharge. Ground all equipment containing material. If ingested, seek medical advice immediately and show the container or the label. Take precautionary measures against electrostatic discharges. Wear suitable protective clothing. The fusehead is sensitive to electrostatic discharge (ESD) and users should take precautions to minimise the chance of ED exposure and static build up.

**Storage:** Store in a segregated, approved and labelled area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark and flame). See section 15 for specific regulations.

## 8. EXPOSURE CONTROLS/PERSONAL CONTROL

### Occupational Exposure Limits: (in a manufacturing environment)

Ingredient Name	Occupational Exposure Limits
Lead and lead inorganic compounds	80/1107/EEC (Europe, 1998) TWA: 0.15mg/m <sup>3</sup> 8 hour(s)

TWA - the Time-Weighted Average airborne concentrations over an eight-hour working day, for a five-day working week over an entire working life.

Short term OEL (STEL) - the average airborne concentration over a 15-minute period, which should not be exceeded at any time during a normal eight-hour working day. According to current knowledge these concentrations should neither impair the health of, nor cause undue discomfort to nearly all workers.

**Engineering measures:** Keep materials in their original packaging to prevent exposure. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Hygiene measure:** Wash hands, forearms, and face thoroughly after handling compounds and before eating, smoking, and at the end of the day.

**Personal protection:** Wear anti-static clothing and shoes while handling the units.

**Eyes:** Safety glasses with side shields

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Physical state:** A PCB with a fusehead soldered to the PCB and covered by a Santoprene H-Plug.

**Explosive properties:** Deflagrates in the presence of open flame, high temperatures, electrostatic discharge, impact or excessive shock.

Specific Gravity (20°C): <b>N App</b>	Melting Point (°C): <b>N App</b>	Rel Vapour Density (air=1): <b>N App</b>
Boiling Point (°C): <b>N App</b>	Vapour Pressure (20°C): <b>N App</b>	Decomp.Point (°C): <b>N App</b>
Flash Point (°C): <b>N App</b>	Sublimation Point: <b>N App</b>	Flammability Limits (%): <b>N App</b>
pH: <b>N App</b>	Auto-ignition Temp (°C): <b>230</b>	Viscosity: <b>N App</b>
% Volatile by volume: <b>N Av</b>	Evaporation Rate: <b>N App</b>	Solubility in water: <b>N App</b>

**N Av** = Not available, **N App** = Not Applicable

## 10. STABILITY AND REACTIVITY

**Stability:** The product is stable

**Conditions to avoid:** Heating may cause an explosion. May be initiated by impact, high temperatures, open flames or electrostatic discharge.

**Materials to avoid:** None identified

**Hazardous decomposition products:** These products are lead compounds, carbon oxides (CO, CO<sub>2</sub>) nitrogen oxides (NO, NO<sub>2</sub>...).

**Hazardous polymerization:** Will not occur

## 11. TOXICOLOGY INFORMATION

**Inhalation:** Harmful in case of inhalation. Inhalation of smoke fumes or dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Over-exposure by inhalation may cause respiratory irritation.

**Skin contact:** Hazardous in case of skin contact – irritating to skin, absorption of lead.

**Eye contact:** Hazardous in case of eye contact – moderately irritant.

**Ingestion:** Harmful if swallowed (lead).

**Target organs:** Contains material which causes damage to the following organs: Blood, kidneys, liver, gastro-intestinal tract, central nervous system (CNS).

**Long-term exposure:** Long-term exposure to low concentrations of Lead fumes may result in altered haemoglobin breakdown, kidney damage, anaemia, and central and peripheral nervous system damage. Inflammation of gastro-intestinal mucosa and renal tubular degeneration.

### Acute toxicity

Ingredient Name	Test	Result	Route	Species
Lead and lead inorganic compounds	LDLo	160mg/kg	Oral	Pigeon

Special Remarks on Toxicity to Animals: No additional remark.

### Specific Effects

Ingredient Name	Carcinogenic Effects	Mutagenic Effects	Developmental Toxicity	Impairs Fertility
Lead and lead inorganic compounds			Repr. Cat. 1; R61	Repr. Cat. 3;R62

**Special remarks on chronic effects on humans:** No additional remarks.

**Special remarks on other toxic effects on humans:** Bio-accumulative potential (lead compounds)

## 12. ECOLOGICAL INFORMATION

Mobility, persistence/degradation, bioaccumulation and ecotoxicity:

Material as supplied and undamaged, presents no ecological problems provided any waste is correctly disposed of. Components are explosive and toxic to aquatic life.

### Ecotoxicity Data:

Ingredient Name	Species	Period	Results
Lead and lead inorganic compounds	Trout (LC50)	96 hours	0.14 ppm
	Shrimp (LC50)	48 hours	375 ppm

Ecological information:

Mobility: Not available  
 Soil/Water Partition Coefficient ( $K_{oc}$ ): Not available  
 Persistence/degradability: Not readily biodegradable  
 Bio accumulative potential: Possible

Ingredient Name	Persistence/Degradability						Bio accumulative potential		
	BOD <sub>5</sub>	COD	ThOD	Aquatic Half Life	Photolysis	Biodegradability	LogP <sub>ow</sub>	BCF	Potential
Lead and lead inorganic compounds				28 – 100 day(s)	28 – 100 day(s)	Not readily	1.37	0.4	Low
								92000	High

Remarks: May be harmful to the environment if released in large amounts

## 13. DISPOSAL CONSIDERATIONS

Disposal should be in accordance with the local Explosives Acts and Regulations

**Methods of disposal:** Waste must be disposed of in accordance with National, provincial and local environment control regulations. Call for assistance on disposal. **Disposal of this product should only be undertaken by trained personnel.**

**Waste classification:** Hazardous waste.

**European Waste Catalogue:** Not available.

#### 14. TRANSPORT INFORMATION

UN Number: UN 0454  
IMDG Class: 1.4S  
Packaging Group: 2  
Shipping name: Igniters

#### 15. REGULATORY INFORMATION

South African users should ensure that they comply with the Explosives Act, Act no. 13 of 2003 as amended or the latest official act in force. International users should comply with the Acts and Regulations as applicable in their respective countries.

##### EU Regulations Hazard symbol(s):



Explosive

##### Indicator of danger:

**Risk phrases:** R2 - Risk of explosion by shock, friction, fire or other source of ignition

**Safety phrases:** S16 - Keep away from sources of ignition – no smoking  
S33 - Take precautionary measures against static discharge  
S34 - Avoid shock and friction  
S35 - This material and its container must be disposed of in a safe way

##### Product use:

Classification and labelling have been performed according to EU directives 67/548/EEC, 1999/45/EC including amendments and the intended use. - Industrial application sources of ignition.

## 16. APPLICATION LIMITATIONS

Recommended Safety distances for transmitters within the frequency range of 150 KHz to 2.5GHz. These are general recommendations and specific frequencies can be tested for on request if shorter distances are required.

**Unconnected or non-powered units**, a minimum of 0.2m distance for devices under 25W power output and a minimum recommend distance of 5m for devices with a higher than 25W must be observed. (This is the general DetNet rule. Use table 2 for more specific transmitter distances.)

Table 1

Transmitter strength	Typical device	Low voltage state (During testing and programming)		High Voltage state (Arming and ready to blast)
		Minimum distance to operate the system safely <sup>1</sup>	Minimum distance to enable full system functionality <sup>2</sup>	
< 2 watt	Cellular phones	0.5 m	1.5 m	2.0 m
< 5 watt	Handheld Radios	1.0 m	2.0 m	3.0 m
< 20 watt	Truck radios	1.5 m	4.0 m	10 m
> 20 watt	Other	5 m	10 m	15 m

Table 2 indicates the safety distances applicable to the unconnected or non-powered units for RF transmitters according to their power output.

Table 2

Distance (m)	Antenna Gain (Lin) = 2 (3 dBi) Transmitter power (W)									
	0.25	0.5	1	2	5	10	20	25	50	100
0.1										
0.2										
0.3										
0.5										
1										
1.5										
2										
3										
4										
5										
10										
15										
20										
25										
30										
50										
100										

>200V/m Detonators may be unsafe for handling at these distances (Possible unintended initiation)

<200V/m Detonators safe for handling at these distances

<sup>1</sup> The distance at which the system may experience intermittent communication problems at specific frequencies.

<sup>2</sup> The distance at which the system is not susceptible to RF interference over the frequency band 150 KHz - 2.5GHz.



## 17. OTHER INFORMATION

### Full text of R-phrases with no.:

- R2 - Risk of explosion by shock, friction, fire or other sources of ignition
- R3 - Extreme risk of explosion by shock, friction, fire or other sources of ignition
- R9 - Explosive when mixed with combustible material
- R10 - Flammable
- R61 - May cause harm to the unborn child
- R62 - Possible risk of impaired fertility
- R20/22 - Harmful by inhalation and if swallowed
- R22 - Harmful if swallowed
- R36/38 - Irritating to the eyes
- R33 - Danger of cumulative effects
- R50/53 - Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

### Text of classifications appearing:

- E - Explosives
- O - Oxidizing
- F - Highly flammable
- Repr. Cat. 1 - Toxic for reproduction Category 1
- Repr. Cat. 3 - Toxic for reproduction Category 3
- Xn - Harmful
- Xi - Irritant
- N - Dangerous for the environment

### Other special considerations:

South African users should ensure that they comply with the Explosives Act, Act No. 26 of 1956 as amended. The material is classified as Class 6, Division 1, and Group 6A product. International users should comply with the Acts and Regulations as applicable in their respective countries.

This Material Safety Data Sheet summarises at the date of issue our best knowledge of the health and safety hazard information of the product. Since DetNet South Africa (Pty) Ltd. cannot anticipate or control the conditions under which the product may be used, each user must prior to usage, review this Material Safety Data Sheet in the context of how the user intends to handle and use the product in the workplace. In the event of uncertainty or for further information on these products and their safe storage and use, contact your local sales office.

## 18. REFERENCE DOCUMENTATION

Vulcan Fusehead P339E (AEL)

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