Overview

e2v technologies’ range of Exploding Foil Initiator (EFI) based detonators has been developed as a safer, more insensitive alternative to Exploding Bridge Wire (EBW) detonators and other explosive initiation devices. They are safe to transport, handle, commission and use providing the directions contained in this note are followed and safe working practices are used.

Primary explosives are not used in the manufacture of EFI detonators.

e2v detonators are packaged in antistatic foam and contained in UN approved steel ammunition cans of type M2A1 or H83.

Inherent Hazards

Detonators, by their very nature, contain explosive materials or compositions in limited quantities. The e2v technologies range of detonators contains the secondary explosive hexanitrostilbene (HNS) in multiples of 160mg. HNS has been chosen for its excellent temperature and chemical stability and good aging properties. However, as with all explosives, there is a residual risk of fire and/or explosion that arises from the presence of an energetic material.

HNS typically has a figure of insensitiveness of 82 and is therefore regarded as reasonably sensitive to shock. Care must be taken not to introduce kinetic energy that may exceptionally cause fire or detonation.

EFI detonators require very fast high current pulses in order to function correctly and therefore are immune to electromagnetic signals, including high power radar. It is, however, always good practice to shield detonators from such sources. Similarly, although the risk of unintentional detonation by electrostatic discharge is extremely remote, devices should be protected from electrostatic discharge. The steel ammunition can and antistatic foam pack provide the necessary protection against these hazards, consequently devices should be kept in their packs until point of use. It is recommended that static safe handling methods are employed when handling the detonators.
Operational Hazards

The following hazards must be included in a risk assessment, in order to ensure the operating risks are minimised by the use of appropriate controls and protective measures.

- **Mass Explosion** – the sudden liberation of large volumes of hot gas and significant metallic fragments travelling at high velocity, together with a significant blast wave.
- **Noise** – Peak sound intensity at 2 metres from the detonator can be >140 dB(C) for a short time, which exceeds typical peak sound pressure occupational exposure limits.
- **Fire** – The heat from the explosion and any afterburn may cause fire in nearby combustible material.
- **High Voltage** – if shipped integrated with an Electronic Safe Arm Unit, voltages up to 6 kV are present within the device when ‘Armed’.

Decommissioning

Should equipment containing detonators and detonating systems need to be decommissioned it is of vital importance to ensure that a minimum of personnel are at risk from accidental detonation. Local safety regulations and Explosives Ordnance Disposal (EOD) practices must be adhered to.

As a general rule, power to the detonating system must be removed and the assembly left for such time as to ensure that no stored energy remains as determined by calculation and risk assessment. Wherever possible the firing system reservoir capacitor voltage should be shorted, or measured electrically to confirm that it has been discharged immediately prior to disconnecting the detonator.

Once isolated, the detonator should be removed from the remaining explosive train and recovered to suitable storage. **On no account** should recovery be attempted in the event of misfire or partial function of the detonator except by a trained EOD crew.

Disposal

HNS and HNS-based detonators may safely be disposed of by controlled burning in open air. No more than 50 grams of HNS should be disposed of at one time.

Where users do not have facilities for the safe decommissioning and disposal of the devices, e2v may be able to offer a decommissioning service. Contact your e2v sales office for further information.

An email contact form is available on the e2v technologies website at [http://www.e2v.com/contact-us-on-line](http://www.e2v.com/contact-us-on-line).

**Important Note:** If products containing explosive need to be returned to e2v, a Return Material Authorisation must first be obtained and the products must be returned **only** to e2v Lincoln, 168 Sadler Road, Lincoln, LN6 3RS, United Kingdom (telephone +44 (0)1522 500815). Do **not** return to e2v Chelmsford.

Material Data

- Contains lead (as solder) <1 gram
- May contain hexavalent chromium <0.1 gram
- Body material: Aluminium
- Stripline: Copper conductor, polyimide insulator

Hexanitrostilbene explosive see Eurenco material safety data sheet appended to this document for hazards and handling data for hexanitrostilbene (HNS)

Emergency Contact

If you require assistance in an emergency, please call +44 (0)1245 453220 (24 hours).

Appendix

1 PRODUCT IDENTIFICATION AND NAME OF THE COMPANY

1.1 Product name
Hexanitrostilbene, HNS

1.1.1 Former SDS included
NSEB12, NSEB13, NSEB21, NSEB23, NSEB27, NSEB28, NSEB29, NSEB41, NSEB43, NSEB44, NSEB45, NSEB65

1.2 Recommended use of the chemicals and restriction on use
SU 3, SU 10, PC 11, PROC 3, AC 0, ERC 2

1.3 Supplier
EURENCO Bofors AB
SE-691 86 KARLSKOGA
Tel: +46-568-83050 Int. +46-568-83050
Fax: +46-568-83310 Int. +46-568-83310
eurenco-bofors@eurenco.com
birgitta.pettersson@eurenco.com

1.4 Emergency phone number
+46-586-832 00

2 HAZARD IDENTIFICATION EG-CLASSIFICATION

2.1 Classification of the substance or mixture

<table>
<thead>
<tr>
<th>Route of Exposure</th>
<th>Classification according to KIFS 2005:7</th>
<th>Classification according to CLP (regulation 1272/2008/EC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Harmful by inhalation</td>
<td>Harmful by inhalation</td>
</tr>
<tr>
<td>Skin contact</td>
<td>Harmful in contact with skin</td>
<td>Harmful in contact with skin</td>
</tr>
<tr>
<td>Eye contact</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Harmful if swallowed</td>
<td>Harmful if swallowed</td>
</tr>
<tr>
<td>Fire and explosion hazard</td>
<td>Risk of explosion by shock, fire or other sources of ignition</td>
<td>Explosive; mass explosion hazard.</td>
</tr>
<tr>
<td>Environmental hazards</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Classification according to KIFS 2005:7
Explosive: R 2
Harmful: R 20/21/22

Classification according to CLP (regulation 1272/2008/EC)
Explosive substances, mixtures and articles, Division 1.1: H 201
Acute Oral Toxicity Category 4: H 302
Acute dermal Toxicity Category 4: H 312
Acute Inhalation Toxicity Category 4: H 332

For R-phrases full text, see Section 16

2.2 Labeling information

Risks
Risk of explosion by shock, friction, fire or other sources of ignition. Harmful by inhalation, in contact with skin and if swallowed.

Risk Phrases
R 2
R 20/21/22

Safety Phrases
S 36/37
S 45

MSD2643
H207227A
H208556A
H774932A
H774933A
Labeling information

Hazard

GHS 01

Contains

Hexanitrostilbene

Signal word

DANGER

Hazard statement codes

H 201, Explosive; mass explosion hazard.

Precautionary statement -
preventive

P 210, Keep away from heat / sparks / open flames / hot surfaces. - No smoking.
P 240, Ground / bond container and receiving equipment.
P 250, Do not subject to grinding / shock / friction.

Precautionary Statement action

P 370+ P 380, In case of fire: Evacuate area.
P 373, DO NOT fight fire when it reaches explosives.

Precautionary Statement waste

P501, Dispose of contents/container in accordance with local / regional / national / international regulations.

2.3 Other hazards

-

3 COMPOSITION/INFORMATION ON INGREDIENTS EG-CLASSIFICATION KIFS 2005 :7

3.1 Substances

<table>
<thead>
<tr>
<th>CAS-no</th>
<th>EINECS-no</th>
<th>%</th>
<th>Danger code</th>
</tr>
</thead>
<tbody>
<tr>
<td>20062-22-0</td>
<td>243-494-5</td>
<td>100</td>
<td>E, Xn</td>
</tr>
</tbody>
</table>

COMPOSITION/INFORMATION ON INGREDIENTS CLP-CLASSIFICATION CLP (regulation 272/2008/EC)

3.1 Substances

<table>
<thead>
<tr>
<th>CAS-no</th>
<th>EINECS-no</th>
<th>%</th>
<th>Signal Word</th>
<th>Signal Word Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>20062-22-0</td>
<td>243-494-5</td>
<td>100</td>
<td>Danger</td>
<td>GHS 01</td>
</tr>
</tbody>
</table>

3.2 Mixture

<table>
<thead>
<tr>
<th>CAS-no</th>
<th>EINECS-no</th>
<th>%</th>
<th>Signal Word</th>
<th>Signal Word Codes</th>
</tr>
</thead>
</table>

4 FIRST-AID MEASURES

4.1 Description of necessary first-aid measurer

Inhalation

Fresh air. Rinse nose, mouth and throat with water. Seek medical advice if troubles remain.

Skin contact

Wash with soap and water. Seek medical advice if troubles remain.

Eye contact

Rinse carefully with water. Seek medical advice if troubles remain.

Ingestion

Rinse the mouth with water. Give a few glasses of milk or water if the person is fully conscious and try to cause vomiting. Seek medical advice if troubles remain.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms:

The most important known symptoms and effects specified in the labeling (see section 2) and / or section 11.

4.3 Indication of immediate medical attention and special treatment needed

Treatment: Treat according to symptoms, no known specific antidote.
5 FIRE-FIGHTING MEASURES

5.1 Extinguishing

Suitable extinguishing media
Installed water sprinkler.

Extinguishing media
Powdered extinguishing medium.

5.2 Special hazards arising from the substance or mixture

Fire and Explosion Hazards
The substance reacts explosively with strong oxidizing agents and heat.

Others
In case of fire, evacuate area. Fire can be transformed to detonation. Do not attempt to extinguish.

5.3 Advice for firefighters
See also Section 5.2

6 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid contact with skin and eyes. Use personal protective equipment in case of contact and inhalation of the product.

6.2 Environmental
Prevent the product from entering drains.

6.3 Methods and materials for containment and cleaning up
Avoid creating dust by moistening the product, sweep up and place in labeled containers. Be destroyed by authorized personnel in an approved location. NOTE! Explosives can detonate.

6.4 Reference to other sections

7 HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1
Equipment must be adapted to work with explosives. Avoid spillage.

7.1.2 General advice on hygiene in the workplace
Normal hygiene. Wash hands in connection to breaks and before ingestion.

7.2 Conditions for safe storage, including any incompatibilities
Normal room temperature in a well-ventilated place. Should be stored in tight sealed containers and only in places approved for explosives. Avoid equipment that causes static.

7.3 Specific end uses

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameter
Threshold limit value is missing. A guideline value of 10 mg/m3 can be used. Measurement of dust can be performed according to Swedish Work Environment Authority Method Series No. M1010.

8.2 Exposure

Technical measures
Workplace and methods should be developed to prevent contact with the product.

Respiratory
Use respiratory equipment with particle filter P3

Hand Protection
Rubber gloves in case of direct contact with the skin.
Eye Protection
Wear safety glasses when product can irritate eyes.

Other Protection
Flame retardant treated clothing should be used when working with the product.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. As a complement to the specified personal protective equipment is required comprehensive workwear.

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties
Appearance
Crystalline powder

Colours
Yellow

Odour
Odourless

Solubility
Poorly soluble in water, soluble in dimethylformamide, methylpyrrolidone.

Partition coefficient
n-octanol/water
Log $P_{ow}$ 2.18

Density
1.74 g/ml

Melting point
315 °C

Thermal stability
Stable at +75 °C

Flammable
No

Explosive properties
Yes substance is explosive

Oxidizing properties
No

9.2 Other information
Sensitivity to friction
168 ± 24 N

Sensitivity to impact
7.5 ± 0.5 J

10 STABILITY AND REACTIVITY

10.1 Reactivity
Product is not reactive

10.2 Chemical stability
The substance is chemically stable

10.3 Possibility of hazardous reactions

10.4 Conditions to avoid
Shock, friction, fire, heating or electrostatic charges

10.5 Incompatible materials
Strong oxidizers and strong bases

10.6 Hazardous decomposition products
Nitrous gases formed during heating and fire.
11 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

LD₅₀ (acute, oral)  Mouse: 5 000 mg/kg
Inhalation  Burning in nose, mouth and throat.
Skin  Can be irritating to the skin.
Eye  Symptoms that may arise are burning and redness.
Ingestion  Possible symptoms include burning in the mouth and throat.

12 ECOLOGICAL INFORMATION

12.1 Toxicity  Information is missing
12.2 Persistence and degradability  Information is missing
12.3 Bioaccumulative  The product is not considered to be bioaccumulative.
12.4 Mobility in soil  Information is missing
12.5 Results of PBT and vPvB assessment  Information is missing
12.6 other adverse effects  Information is missing

13 DISPOSAL CONSIDERATION

13.1 Waste treatment
Handling of contaminated packaging  Packaging should be handled as dangerous goods.
Generally  Waste and contaminated packaging should be disposed of as waste explosives. When heated, there is risk of explosion. Disposal must be carried out at an intended place and by trained personnel.
Hazardous waste, EWC-code  Yes, 160403: Waste explosives

14 TRANSPORT INFORMATION

14.1 UN number  0392
14.2 UN Proper shipping name  Hexanitrostilbene
14.3 Transport hazard class  1.1D
14.4 Packing group  II
14.5 Marine Pollutant  No
14.6 Special precautions -
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code -
15 REGULATORY INFORMATION EG/CLP-CLASSIFICATION

15.1 regulations / legislation specific for the substance or mixture in terms of safety, health and environment code


Kemikalieforskrifter KIFS 2005:7
The product belongs to Category SevK05

15.2 Chemical Safety Information is missing

16 OTHER INFORMATION

Risk phrases R2, Risk of explosion by shock, friction, fire or other sources of ignition. R20/21/22, Harmful by inhalation, in contact with skin and if swallowed.

Safety phrases S36/37, Wear suitable protective clothing and gloves. S45, In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Hazard Statement codes CLP classification H 201, Explosive; mass explosion hazard. Expl. 1.1 H 302, Harmful by inhalation. Acut tox. 4 H 312, Harmful in contact with skin. Acut tox. 4 H 332, Harmful if swallowed. Acut tox. 4


Precautionary Statement storing P 401, Store in accordance with local / regional / national / international regulations.

Precautionary Statement waste P 501, Dispose of contents/container in accordance with local / regional / national / international regulations.

Revision
Ed. 6 2012-10-15
Changed paragraphs 1-16
Ed. 5, 2012-03-28
pt 1 SU 3, SU 10, PC 11, PROC 3, AC 0, ERC 2
pt 2 Labelling and packaging Ed. 4 2011-09-02
pt 8 Changed gloves too Hand protection;
pt. 15 Moved to section 2
pt. 15 New information
Pt. 16 Removed the information contained in the point 2