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1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product Identifier	Digishot Electronic Detonators
1.2 Use of the Product:	A precision initiation system for explosive charges used in commercial mining
1.3 Details of the Supplier of the MSDS:	
Name	EPC-UK EXPLOSIVES
Address:	ROUGH CLOSE WORKS CARNFIELD HILL SOUTH NORMANTON ALFRETON DERBYSHIRE, DE55 2BE
Telephone Number:	01773 832253
Contact e-mail	info@epc-groupe.co.uk
1.4 Emergency Telephone Number:	01773 832253

2. HAZARD IDENTIFICATION

2.1 Classification


Electric detonators are designed to explode with a substantial release of energy and should therefore be handled with care. Detonators must not be subjected to impact, friction, or exposed to heat or flame. There is a danger of high velocity penetrating shrapnel within a radius of 5m when packed as 1.4S and 10 m around a detonator when packed as 1.1B or removed from 1.4S packaging. Detonators are explosive articles. Without packaging electronic detonators are classified Exp 1.1 H201 (explosive: mass explosion hazard).

As packaged for transport Digishot detonators may be Class 1.1B or Class 1.4S

Classification of substance of mixture: Explosives – division 1.1B; H201
Explosives – division 1.4S, H204
Signal word: DANGER
Hazard Symbols:



Hazard Statements and Codes: 1.1B H201 – Explosive; mass explosion hazard
1.4S H204 – Fire or projection hazard
Precautionary Statements: P103 Read label before use.
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.

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P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P250 Do not subject to grinding/shock/friction/impact
P280 Wear protective gloves/protective clothing/eye and face protection.
P281 Use personal protective equipment as required.
P273 Avoid release to the environment.
P370; P380; In case of fire: Explosion risk. Evacuate area.
P372; P373 DO NOT fight fire when fire reaches explosives.
P308; P313 IF exposed or concerned: Get medical advice.
P401 Store in accordance with relevant local/regional/national/ international regulations as applicable
P501 Dispose of contents/container in accordance with local, regional, national and international regulations.


Other Hazards

Explosive Product Notice

PREVENTION OF ACCIDENTS IN THE USE OF EXPLOSIVES - The prevention of accidents in the use of explosives is a result of careful planning and observance of the best-known practices. The user of the explosives must remember that a powerful force is being dealt with and that various devices and methods have been developed to assist in directing this force. It should also be realized that this force, if misdirected, may either kill or injure both the user and fellow workers.









WARNING - All explosives are dangerous and must be carefully handled and used following approved safety procedures either by, or under the direction of competent, experienced persons in accordance with all applicable national and local laws, regulations, or ordinances. If you have any questions or doubts as to how to use any explosive product, DO NOT USE IT before consulting with your supervisor, or the manufacturer if you do not have a supervisor. If your supervisor has any questions or doubts, he should consult the manufacturer before use.

For more details on the toxicological properties of the hazardous components, see, please refer to Chapter 11.

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3. COMPOSITION/INFORMATION ON THE INGREDIENTS

3.1 Ingredients

Chemical Name	CAS no.	EC number	Index	Classification
Lead Compounds	7439-92-1	231-100-4		 Repr 1A H360FD  STOT RE1 H372  Aquatic Acute 1 H400, Aquatic Chronic 1 H410
Lead Diazide	13424-46-9	236-542-1	082-003-00-7	 Unst. Expl. H200  Acute Tox. 4 H302, H332; STOT RE 2 H373  Aquatic Acute 1 H400; Aquatic Chronic 1 H410  Repr. 1A, H360Df
PETN	78-11-5	201-084-3	603-035-00-5	 Unst Exp H200

Lead Diazide is included in the ECHA list of substances of very high concern

The percentages and non-hazardous materials are withheld by the manufacturer as a trade secret.

Refer to section 16 for wording of hazard statements

Additional Information

Other Ingredients:



Glass, quartz, phosphor bronze, PVC, LDPE, Bergaflex, ink, resin, silicon, tantalum, ceramic, copper, aluminium, gold, tin, Santoprene, Arnite, polypropylene, nickel, chromium, iron, and ABS.

Recommended use:

A precision initiation system for explosive charges used in commercial mining and civil operations.

Appearance:

A copper tube of 7,5mm OD and 88.9 ± 0.25mm in length and may have the wording DANGEROUS - BLASTING CAP - EXPLOSIVE and DANGER - DETONATEUR - EXPLOSIF printed on the tube. No bottom markings on the 88.9mm tube. A coloured cable is secured in the tube by means of a crimp plug

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4. FIRST AID MEASURES

4.1 Description of First Aid Measures



- First Aid – Eyes:** Unlikely unless detonator is fired. Obtain medical attention immediately
- First Aid – Skin:** Not harmful unless detonator is fired. Treat for high velocity trauma, stop bleeding and obtain medical attention immediately
- First Aid – Ingestion:** Not normal route of entry, but seek medical advice immediately. Make physician aware of explosive properties of ingested material
- First Aid – Inhalation:** Unlikely unless detonator is fired in a confined space and not in an open ventilated environment. Remove patient from NO₂ exposure to clean air and obtain medical attention. Administer oxygen if possible

4.2. Most Important Symptoms and Effects, Both Acute and Delayed

Trauma due to high velocity shrapnel. Keep under observation for lead poisoning.

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

Treat symptomatically


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5. FIRE FIGHTING MEASURES

- 5.1 Extinguishing Media:** **Do not fight the fire** if it has reached, or if it will reach the detonators. If fire may be prevented from reaching the explosives, water, carbon dioxide, extinguishing powders or alcohol resistant foams may be used as appropriate. Don't use water if electrical equipment is involved.
- **DO NOT ATTEMPT TO EXTINGUISH THE BURNING EXPLOSIVES! RISK OF EXPLOSION.**
- Try to remain calm and extinguish the fire before it reaches the product. In case of the risk of an explosion, do not attempt to extinguish the fire. Evacuate. Secure the site against unauthorized access.
- 5.2 Special Hazards Arising from Product:** Material is Explosive. Avoid all sources of ignition. Avoid stray currents. Risk of explosion by shock, friction, fire or other sources of ignition. Will emit toxic fumes on burning, including those of oxides of lead, oxides of nitrogen, oxides of chromium and oxides of carbon. Evacuate all personnel to a safe distance of no less than 750 meters. Evolves toxic fumes (hydrogen chloride and phosgene) from the PVC when heated to the decomposition temperature
- 5.3 Advice for Firefighters:** Do not personally intervene to stop a pyrotechnics fire. Material is explosive. In case of small fire where the actual explosive is not involved, carefully remove explosive to a safe distance, otherwise evacuate area immediately and allow to burn. Severe explosive hazard when shocked or exposed to heat. Confinement of burning material may result in detonation. Mass explosion hazard. Whenever possible, measures should be taken to prevent the fire from spreading. Set up a safety perimeter. After the fire has been extinguished, the site where it took place may only be entered after ascertaining that the entire area has cooled completely. Be aware of unexploded detonators in area. When intervening, wear special fire prevention equipment (respiratory device, helmet, etc.).

6. ACCIDENTAL RELEASE MEASURES

- 6.1. Personal precautions, protective equipment and emergency procedures:** Damaged or cracked detonators may be very sensitive to sources of ignition. Do not pick up or move damaged detonators. Shut off all possible sources of ignition. Evacuate the area and then inform the relevant authorities or responsible person immediately. In case of a transport accident, notify the local authorities / police, the transport company and supplier.
- 6.2 Environmental Precautions:** Not applicable
- 6.3. Methods and material for containment and cleaning up** While undamaged detonators may be picked up, freed of loose contamination and carefully pack in suitable, preferably original, packaging. (Note any change of packing may affect the transport classification). Pyrotechnic materials spilled accidentally must be

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- 6.4. **Reference to other sections** collected by authorised personnel, so that they can be disposed of and, if necessary, destroyed (see waste handling, section 13).
See sections 8 and 13

7. HANDLING AND STORAGE

- 7.1 Precautions for Safe Handling:** Handle with great care. Impact, heat, or flame may cause an explosion. Do not tamper with device or attempt to gain access to any internal components. Keep away from sources of ignition. Keep away from all sources of electrostatic discharge. Ground all equipment containing material. If any of the contents of the device are ingested, seek medical advice immediately and show the container or the label. Wear suitable personnel protective equipment. Handle with great care. Impact, electrostatic discharge, heat or flame may cause an explosion. Avoid high-energy fields such as microwave relay stations and radar transmitters.
- 7.2 Conditions for safe storage, including any incompatibilities:** Keep locked up in a well-ventilated magazine, licenced in accordance with the Explosives Regulations 2014. Keep materials in their original packaging wherever possible. The product has a 5-year shelf life from the date of manufacture when stored in accordance with the relevant regulatory requirements.
COMAH storage limits for Explosives depends on the classification:
- | | | |
|------------|------------|------------|
| | Class 1.1 | Class 1.4 |
| Lower Tier | 10 tonnes; | 50 tonnes |
| Upper Tier | 50 tonnes; | 200 tonnes |
- 7.3 Specific end use(s)** Detonator for blasting

8. EXPOSURE CONTROL / PERSONAL PROTECTION

- 8.1 Control Parameter:** Hazardous materials are encapsulated. No exposure during normal handling is therefore expected
Exposure limits for contents:
Lead and lead inorganic compounds: TWA 0.15 mg/m³ (8 hours)
Exposure through the skin may be significant
Lead Azide is listed in the ECHA list of substances of very high concern
- 8.2 Exposure controls** Keep materials in their original packaging to prevent exposure. Provide adequate ventilation and where possible ear protection when firing, Where possible wear safety spectacles and non-static producing clothing when handling the detonators.

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9. PHYSICAL AND CHEMICAL PROPERTIES


9.1 Basic physical and chemical properties

(a) appearance	A copper tube of 7.5 mm OD and 94.0±0.25 mm or 88.9±0.25 mm in length and may have the words DANGEROUS – BLASTING CAP EXPLOSIVE or DANGER – DETONATEUR – EXPLOSIF printed on the tube. A red coloured cable is secured in the tube by means of a pliable / elastic PVC crimp plug
(a) Odour:	Not available
(b) Odour threshold	Not available
(c) pH:	Not applicable
(d) Melting point / Freezing Point	Not applicable
(e) Initial Boiling point and boiling range	Not applicable
(f) Flash point:	Not applicable
(g) Evaporation Rate:	Not applicable
(h) Flammability:	Not applicable
(i) Upper / lower flammability or explosive limits	Not available
(j) Vapour pressure,	Not applicable
(k) Vapour density	Not applicable
(l) Relative Density	Not applicable
(m) Solubility(ies)	Not applicable
(n) Partition coefficient (n-octanol / water):	Not applicable
(o) Auto-ignition temperature	140°C
(p) Decomposition temperature	140°C
(q) Viscosity:	Not applicable
(r) Explosive properties	Explosive Article (1.1B or 1.4S depending on packaging)
(s) Oxidising properties	Not applicable

9.2 Other information Not applicable

10. STABILITY AND REACTIVITY

10.1 Reactivity:	Contains explosive material. Do not expose to temperatures greater than 80 C
10.2 Chemical Stability	Stable within the temperature range -40 to +80C. Detonation can occur from impact, friction, excessive heating or by electrical energy from an extraneous source (lightning, static electricity, stray currents, galvanic electricity or electromagnetic radiation).
10.3 Possibility of Hazardous Reactions	Not applicable
10.4 Conditions to avoid	Avoid any exposure to high temperatures, impacts, friction, electrostatic discharges or stray currents
10.5 Incompatible materials	Acids and alkalis
10.6 Hazardous Decomposition Products:	Carbon dioxide, Carbon monoxide, lead compounds and oxides of nitrogen

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11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects	Hazardous materials are encapsulated. No exposure during normal handling is therefore expected
(a) acute toxicity	Fumes from firing may cause irritation to the gastrointestinal tract. Keep under observation for lead poisoning Properties of material enclosed inside the detonator Lead and lead compounds LDLo: 160 mg/kg, Oral, Pigeon PETN LD50: 1,660 mg/g, Oral. rat LDLo: 7,000 mg/kg, Oral, mouse
(b) skin corrosion / irritation	When explosion occurs, treat for high velocity trauma, stop bleeding and obtain medical attention as soon as possible
(c) Serious eye damage / irritation	Fumes from firing may cause eye irritation
(d) reproduction toxicity	Lead and lead compounds can cause developmental toxicity, impair fertility
(e) STOT – single exposure	No data available
(f) STOT –repeated exposure	Bio-accumulative potential (lead) May cause damage to organs through prolonged or repeated exposure
(g) aspiration hazard	Not applicable

12. ECOLOGICAL INFORMATION

12.1 Toxicity:	Items as supplied and undamaged present no ecological problems to the environment, provided they are disposed of correctly. Components inside the detonator are explosive and toxic to aquatic life
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Ingredient name	Species	Period	Result
Lead and Lead Inorganic compounds	Trout (LC50)	96 hrs	0.14 ppm
	Shrimp (LC50)	48 hrs	375 ppm
PETN	Pimephales promelas (LC50)	96 hrs	27,000 ppm



12.2 Persistence and Degradability:	Not readily bio-degradable
--------------------------------------------	----------------------------

Ingredient name	Persistence/ degradability				Bio-accumulative potential	
	BOD ₅	COD	THOD	Aquatic half life biodegradability	Log P _{ow}	BCE Potential
Lead and Lead Inorganic compounds	Not readily				92,000 high	
PETN	<28 days				74	low

May be harmful to the environment if released in large amounts

12.3 Bioaccumulation potential;	Possible
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12.4 Mobility in soil	Not available
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13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods:

Product disposal

Do not place in waste bins, drains, or landfill.



Processing and destruction require specific procedures and must also take into account the product's condition and treatment of the waste after destruction. This operation must be carried out by trained, authorised personnel in approved areas. All materials contaminated by pyrotechnic materials from the item should also be considered pyrotechnic waste. See the HSE/CBI-EIG Guidance

Container Disposal:

While packaging may often be destroyed by burning, great care must be taken to ensure there are no detonators remaining inside.

14. TRANSPORT INFORMATION

14.1 UN Number :	UN 0030	UN 0456
14.2 UN Proper Shipping Name :	Detonators, Electric, for Blasting	Detonators, Electric, for Blasting
14.3 Transport Hazard Classes:	1.1B	1.4S
14.4 Packing Group :	Not applicable	Not applicable
14.5 Environmental Hazards	Not applicable	Not applicable
14.6 Special Precautions for User		
ADR Specifics (road)	None	None
IATA specifics (Air)	Forbidden	None
IMDG specifics (sea)	None	None
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable	Not applicable

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SECTION 15. REGULATORY INFORMATION

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

UK Legislation:	Carriage of Dangerous Goods Regulations 2009, as amended – implementing ADR Classification (Hazard Information and Packaging for Supply) Regs 2009, as amended. Control of Substances Hazardous to Health regs 2002, as amended The Explosives regulation 2014, as amended Control of Major Accident Hazard Regulations 2015 The Control of Lead at Work regulations 2002
EC Regulations	Registration Evaluation, Authorisation and Restriction of Chemicals Regulations 2006, as amended Classification Labelling and Packaging Regulations 2008, as amended

15.2 Chemical Safety Assessment Not applicable

16. OTHER INFORMATION

(a) Changes

Issue	Issue Date	Changes
1	06/02/2017	New issue based on manufacturer's SDS
2		Section 2.1 re-worded and expanded 3.1 Added details about component substances 4.1 first aid inhalation. Wording expanded 4.2 extra wording about lead poisoning 5.2 Added further information about toxic fumes 5.3 Added further information to fire fighters 7.1 precautions for safe handling expanded 7.2 included keep locked up. 9.1 Autoignition and decomposition temperatures changed 10.1 & 10.2 included temperatures Section 16 (g) added

(b) Abbreviations and acronyms

ECHA: European Chemical Agency

(c) References

HSE/CBI EIG publication "Guidance for the Safe Management of the Disposal of Explosives", January 2007

(d) Evaluation method for mixtures: Not applicable

(e) Meaning of Hazard Phrases and Precautionary statements


Meanings of Hazard Phrases

H201 : explosive : mass explosion hazard

H302, Harmful if swallowed

H332 Harmful if inhaled

H360Df: May damage the unborn child. Suspected of damaging fertility

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H360FD: May damage fertility. May damage the unborn child
H373 May cause damage to organs through prolonged or repeated exposure
H400 Very toxic to aquatic life
H410 Very toxic to aquatic life with long-lasting effects

(f) Advice on training
Users of detonators and other explosives should undergo suitable training, e.g. shot firer's course.
Contact EPC-UK for availability of courses

(g) Further information
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: Intermittent communication problems at specific frequencies

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 ¹	Minimum distance to enable full system functionality ²	
< 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: Safety distances applicable to unconnected or non-powered units for RF transmitters

Antenna Gain (Lin) = 2 (3 dBi)

Transmitter power (W)

metres↓	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										
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

**Notice: FOR FURTHER INFORMATION CONTACT
EPC-UK EXPLOSIVES EXPLOSIVE ENGINEERING DEPARTMENT**