

# DX-Cartridge

## Product Safety Information Sheet

A safety data sheet is not required for this product under Article 31 of REACH. This Product Safety Information Sheet has been created on a voluntary basis  
 Issue date: 17/12/2025      Revision date: 17/12/2025      Version: 4.1

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

#### 1.1. Product identifier

Product form	Article
Name	DX-Cartridge
Product code	BU Direct Fastening

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

##### 1.2.1. Relevant identified uses

Use of the substance/mixture	CARTRIDGES FOR TOOLS, BLANK
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##### 1.2.2. Uses advised against

Restrictions on use	For professional use only
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#### 1.3. Details of the supplier of product safety information sheet

##### Supplier

Hilti (Fastening Systems) Limited  
 Unit C4  
 North City Business Park, Finglas  
 IE 11 Dublin  
 Ireland  
 T +353 188 64101  
 1850-287 387 Call Save, F +353 183 03569  
[iesales@hilti.com](mailto:iesales@hilti.com)

##### Department issuing data specification sheet

Hilti AG  
 Feldkircherstraße 100  
 FL 9494 Schaan  
 Liechtenstein  
 T +423 234 2111  
[product.compliance-direct.fastening@hilti.com](mailto:product.compliance-direct.fastening@hilti.com)

#### 1.4. Emergency telephone number

Emergency number	Emergency CONTACT (24-Hour-Number): GBK GmbH Global Regulatory Compliance +49 (0)6132-84463  +353 188 64101 1850-287 387 Call Save
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Country	Organisation/Company	Address	Emergency number	Comment
Ireland	National Poisons Information Centre Beaumont Hospital	PO Box 1297 Beaumont Road 9	+353 1 809 2566 (Healthcare professionals- 24/7) +353 1 809 2166 (public, 8am - 10pm, 7/7)	

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

##### Classification according to Regulation (EC) No. 1272/2008 [CLP]

Explosives, Division 1.4	H204
Full text of H- and EUH-statements: see section 16	

##### Adverse physicochemical, human health and environmental effects

Fire or projection hazard.

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### 2.2. Label elements

#### Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP)



GHS01

Signal word (CLP)

Warning

Hazard statements (CLP)

H204 - Fire or projection hazard.

Precautionary statements (CLP)

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.

No smoking.

P250 - Do not subject to grinding, friction, shock.

P280 - Wear eye protection.

P370+P380+P375 - In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.

P372 - Explosion risk.

P401 - Store in accordance with local regulations on explosives.

Extra phrases

Category of the pyrotechnic article: other pyrotechnic articles Cat. P1

(BAM EC-Type-Examination Certificate No. 0589.PYR.3800/12 or 0589.PYR.3804/12 respectively).

### 2.3. Other hazards

Other hazards which do not result in classification

This article contains hazardous substances or preparations not intended to be released under normal or reasonably foreseeable conditions of use. The dismantling of the article is prohibited!. Keep away from ignition sources (including static discharges).

This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII

This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

Contains no PBT and/or vPvB substances  $\geq 0.1\%$  assessed in accordance with REACH Annex XIII

Component	
cellulose nitrate (9004-70-0)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
glycerol trinitrate (55-63-0)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
Lead styphnate (15245-44-0)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
Barium nitrate (10022-31-8)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
copper (7440-50-8)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
zinc (7440-66-6)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
Diphenylamine (122-39-4)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
tetrazene (109-27-3)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

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Component	
cellulose nitrate (9004-70-0)	The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605
glycerol trinitrate (55-63-0)	The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605
Lead styphnate (15245-44-0)	The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605
Barium nitrate (10022-31-8)	The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605
copper (7440-50-8)	ED: not yet assessed
zinc (7440-66-6)	The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605
Diphenylamine (122-39-4)	The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605
tetrazene (109-27-3)	The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Not applicable

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### 3.2. Mixtures

#### Comments

max. net explosives weight each cartridge in mg:  
 Caliber 6.8/11 (cal .27 short) white: 130; brown: 140; green: 160; yellow: 180; red: 230; titanium: 230; black: 260  
 Caliber 6.8/18 (cal .27 long) green: 190; yellow: 220; blue: 300; red: 330; black: 410  
 Caliber 6.3/10 (cal. 25) green 120; yellow: 190; red: 230; black: 250  
 Caliber 5.5/16 (cal. 22) grey: 105; brown: 120; green: 175; yellow: 210; red: 270  
 Within the cartridges the explosive ingredients (gun powder and priming composition) are hermetically separated from the environment. They will be only opened with effort and under destruction of the article.  
 Propellant powder: glycerol trinitrate containing nitrocellulose powder  
 Mass per cartridge: essentially dependent on the required power (100-400 mg)  
 Exposed propellant powder outside a cartridge is harmful if swallowed and highly flammable; without tamping no explosion risk.  
 Packed safety cartridges don't represent a significant risk.  
 In case of reaction no dangerous fragments or projectiles will be formed.  
 Mechanical or thermal attempts to expose the primer composition lead to an immediate reaction of the dangerous ingredients.

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
cellulose nitrate	CAS-No.: 9004-70-0	5 – 17	Expl. 1.1, H201
glycerol trinitrate	CAS-No.: 55-63-0 EC-No.: 200-240-8 EC Index-No.: 603-034-00-X REACH-no: 01-2119488893-18	2 – 7	Unst. Expl., H200 Acute Tox. 2 (Oral), H300 (ATE=5 mg/kg bodyweight) Acute Tox. 1 (Dermal), H310 (ATE=5 mg/kg bodyweight) Acute Tox. 2 (Inhalation:dust,mist), H330 (ATE=0.05 mg/l/4h) STOT RE 2, H373 Aquatic Chronic 2, H411
Lead styphnate substance listed on REACH Candidate List	CAS-No.: 15245-44-0 EC-No.: 239-290-0 EC Index-No.: 609-019-00-4 REACH-no: 01-2119543737-30	0.1 – 3	Unst. Expl., H200 Acute Tox. 4 (Oral), H302 (ATE=500 mg/kg bodyweight) Acute Tox. 4 (Inhalation:dust,mist), H332 (ATE=1.5 mg/l/4h) Repr. 1A, H360Df STOT RE 2, H373 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
Barium nitrate	CAS-No.: 10022-31-8 EC-No.: 233-020-5	0 – 3	Ox. Sol. 2, H272 Acute Tox. 3 (Oral), H301 (ATE=100 mg/kg bodyweight) Acute Tox. 4 (Inhalation), H332 (ATE=1.5 mg/l/4h) Eye Irrit. 2, H319
copper	CAS-No.: 7440-50-8 EC-No.: 231-159-6	0 – 2	Aquatic Acute 1, H400 (M=10) Aquatic Chronic 3, H412
zinc	CAS-No.: 7440-66-6 EC-No.: 231-175-3 EC Index-No.: 030-001-01-9	0 – 2	Aquatic Acute 1, H400 Aquatic Chronic 1, H410

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Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Diphenylamine	CAS-No.: 122-39-4 EC-No.: 204-539-4 EC Index-No.: 612-026-00-5 REACH-no: 01-2119488966-13	0 – 1	Acute Tox. 3 (Oral), H301 (ATE=100 mg/kg bodyweight) Acute Tox. 3 (Dermal), H311 (ATE=300 mg/kg bodyweight) Acute Tox. 3 (Inhalation:dust,mist), H331 (ATE=0.5 mg/l/4h) Eye Irrit. 2, H319 Carc. 2, H351 STOT RE 2, H373 Aquatic Acute 1, H400 Aquatic Chronic 1, H410
tetrazene	CAS-No.: 109-27-3	0 – 1	Unst. Expl., H200 Eye Irrit. 2, H319 Aquatic Acute 1, H400 Aquatic Chronic 1, H410

Full text of H- and EUH-statements: see section 16

### SECTION 4: First aid measures

#### 4.1. Description of first aid measures

First-aid measures general	In all cases of doubt, or when symptoms persist, seek medical attention.
First-aid measures after inhalation	Allow affected person to breathe fresh air. Allow the victim to rest.
First-aid measures after skin contact	Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.
First-aid measures after eye contact	Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persists.
First-aid measures after ingestion	Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

#### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects	Not expected to present a significant hazard under anticipated conditions of normal use.
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#### 4.3. Indication of any immediate medical attention and special treatment needed

No additional information available.

### SECTION 5: Firefighting measures

#### 5.1. Extinguishing media

Suitable extinguishing media	Dry powder. Water spray.
Unsuitable extinguishing media	Do not use a heavy water stream.

#### 5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products in case of fire	Carbon monoxide. Carbon dioxide (CO <sub>2</sub> ). Nitrous gasses.
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#### 5.3. Advice for firefighters

Firefighting instructions	Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire fighting water from entering the environment.
Protection during firefighting	Do not enter fire area without proper protective equipment, including respiratory protection.

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### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

General measures Remove ignition sources. Use special care to avoid static electric charges. No open flames. No smoking.

##### 6.1.1. For non-emergency personnel

Protective equipment Wear recommended personal protective equipment.  
Emergency procedures Evacuate unnecessary personnel.

##### 6.1.2. For emergency responders

Protective equipment Equip cleanup crew with proper protection.  
Emergency procedures Ventilate area.

#### 6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

#### 6.3. Methods and material for containment and cleaning up

Methods for cleaning up Pick up loose cartridges only by hand.  
Exposed ingredients must be swept up carefully and phlegmatized in a water container, labelled according the regulations, wipe down with water the contaminated area. Store away from other materials.

#### 6.4. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection". For further information refer to section 13.

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

Additional hazards when processed Hazardous waste due to potential risk of explosion.  
Precautions for safe handling Do not subject to grinding, shock, friction. Take precautionary measures against static discharge. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.  
Hygiene measures Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

#### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions Keep only in the original container in a cool, well ventilated place away from : Direct sunlight, Heat sources. Store in a dry place.  
Incompatible products Strong bases. Strong acids.  
Storage temperature 5 – 25 °C  
Information on mixed storage Keep away from : Ignition sources. Do not store with: Store according to local legislation.  
Storage area Store away from heat.

#### 7.3. Specific end use(s)

No additional information available.

### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

##### 8.1.1. National occupational exposure and biological limit values

glycerol trinitrate (55-63-0)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Glycerol trinitrate
IOEL TWA	0.095 mg/m <sup>3</sup>

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glycerol trinitrate (55-63-0)	
	0.01 ppm
IOEL STEL	0.19 mg/m <sup>3</sup>
	0.02 ppm
Remark	Skin
Regulatory reference	COMMISSION DIRECTIVE (EU) 2017/164
Ireland - Occupational Exposure Limits	
Local name	Glycerol trinitrate
OEL TWA	0.5 mg/m <sup>3</sup>
	0.05 ppm
OEL STEL	0.19 mg/m <sup>3</sup>
	0.02 ppm
Remark	IOELV (Indicative Occupational Exposure Limit Values), Skin (Substances which have the capacity to penetrate intact skin when they come in contact with it and be absorbed into the body. A substantial contribution to the total body burden via dermal exposure is possible)
Regulatory reference	Chemical Agents Code of Practice 2024
Ireland - Biological limit values	
Local name	Glycerol trinitrate
BMGV	15 µmol/mol creatinine Parameter: total nitroglycols - Medium: urine - Sampling time: At end of the period of exposure
Regulatory reference	Biological Monitoring Guidelines (HSA, 2011)
Barium nitrate (10022-31-8)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Barium (soluble compounds as Ba)
IOEL TWA	0.5 mg/m <sup>3</sup>
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC
copper (7440-50-8)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Copper
IOEL TWA	0.01 mg/m <sup>3</sup> (respirable fraction)
Remark	(Year of adoption 2014)
Regulatory reference	SCOEL Recommendations
Ireland - Occupational Exposure Limits	
Local name	Copper (as Cu)
OEL TWA	0.2 mg/m <sup>3</sup> Fume
	1 mg/m <sup>3</sup> Dusts and mists
Remark	Advisory OELV (Advisory Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2024

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Diphenylamine (122-39-4)	
Ireland - Occupational Exposure Limits	
Local name	Diphenylamine
OEL TWA	10 mg/m <sup>3</sup>
OEL STEL	20 mg/m <sup>3</sup>
Remark	Advisory OELV (Advisory Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2024

### 8.1.2. Recommended monitoring procedures

No additional information available

### 8.1.3. Air contaminants formed

No additional information available

### 8.1.4. DNEL and PNEC

No additional information available

### 8.1.5. Control banding

No additional information available

## 8.2. Exposure controls

### 8.2.1. Appropriate engineering controls

#### Appropriate engineering controls:

No additional information available.

### 8.2.2. Personal protection equipment

#### Personal protective equipment:

When using cartridge operated tools, sufficient ear protection must be worn.

#### Personal protective equipment symbol(s):



#### 8.2.2.1. Eye and face protection

##### Eye protection:

Chemical goggles or safety glasses. ISO 16321-1

#### 8.2.2.2. Skin protection

##### Skin and body protection:

When using cartridge operated tools, sufficient ear protection must be worn.

##### Hand protection:

Not required for normal conditions of use

#### 8.2.2.3. Respiratory protection

##### Respiratory protection:

Respiratory protection not required in normal conditions

#### 8.2.2.4. Thermal hazards

##### Thermal hazard protection:

No information available.



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### 8.2.3. Environmental exposure controls

#### Environmental exposure controls:

Avoid release to the environment.

#### Other information:

Do not eat, drink or smoke during use.

No additional information available

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state	Solid
Colour	According to product specification.
Odour	There may be no odour warning properties, odour is subjective and inadequate to warn of overexposure.
Odour threshold	Not available
Melting point	Not available
Freezing point	Not available
Boiling point	Not available
Flammability	Not available
Explosive properties	Fire or projection hazard.
Lower explosion limit	Not applicable
Upper explosion limit	Not applicable
Flash point	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	Not available
pH	Not available
pH solution	Not available
Viscosity, kinematic	Not applicable
Solubility	Not available
Partition coefficient n-octanol/water (Log Kow)	Not available
Vapour pressure	Not available
Vapour pressure at 50°C	Not available
Density	Not available
Relative density	Not available
Relative vapour density at 20°C	Not applicable
Particle size	Not available
Particle size distribution	Not available
Particle shape	Not available
Particle aspect ratio	Not available
Particle specific surface area	Not available
Particle dustiness	Not available

### 9.2. Other information

#### 9.2.1. Information with regard to physical hazard classes

No additional information available

#### 9.2.2. Other safety characteristics

Additional information Not applicable. Article

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Fire or projection hazard.

### 10.2. Chemical stability

Stable under normal conditions.

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### 10.3. Possibility of hazardous reactions

Risk of explosion by shock, friction, fire or other sources of ignition. Heating may cause an explosion. At high temperatures : > 150 °C Response.

### 10.4. Conditions to avoid

Extremely high or low temperatures. Heat. Sparks. Open flame. Overheating. Avoid contact with hot surfaces. No flames, no sparks. Eliminate all sources of ignition.

### 10.5. Incompatible materials

Strong acids. Strong bases.

### 10.6. Hazardous decomposition products

Carbon monoxide. Carbon dioxide. Nitrogen oxides. Metal oxides. Thermal decomposition can lead to the release of irritating gases and vapours.

## SECTION 11: Toxicological information

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

Acute toxicity (oral)	Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (dermal)	Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (inhalation)	Not classified (Based on available data, the classification criteria are not met)

glycerol trinitrate (55-63-0)	
LD50 oral	685 mg/kg
LD50 dermal rat	> 9560 mg/kg bodyweight (OECD 402 method)
LD50 dermal	9560 mg/kg

Lead styphnate (15245-44-0)	
LD50 oral rat	> 2000 mg/kg bodyweight
LD50 dermal rat	> 2000 mg/kg bodyweight (OECD 402 method)
LC50 Inhalation - Rat (Dust/Mist)	> 5.05 mg/l/4h (OECD 403 method)

Barium nitrate (10022-31-8)	
LD50 oral	355 mg/kg

Diphenylamine (122-39-4)	
LD50 oral rat	> 800 mg/kg bodyweight
LD50 oral	2480 mg/kg
LD50 dermal	5000 mg/kg

Skin corrosion/irritation	Not classified (Based on available data, the classification criteria are not met)
Serious eye damage/irritation	Not classified (Based on available data, the classification criteria are not met)
Respiratory or skin sensitisation	Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity	Not classified (Based on available data, the classification criteria are not met)
Carcinogenicity	Not classified (Based on available data, the classification criteria are not met)
Reproductive toxicity	Not classified (Based on available data, the classification criteria are not met)
STOT-single exposure	Not classified (Based on available data, the classification criteria are not met)
STOT-repeated exposure	Not classified (Based on available data, the classification criteria are not met)

glycerol trinitrate (55-63-0)	
STOT-repeated exposure	May cause damage to organs through prolonged or repeated exposure.

Lead styphnate (15245-44-0)	
STOT-repeated exposure	May cause damage to organs through prolonged or repeated exposure.

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Diphenylamine (122-39-4)	
STOT-repeated exposure	May cause damage to organs through prolonged or repeated exposure.
Aspiration hazard	Not classified (Based on available data, the classification criteria are not met)

### 11.2. Information on other hazards

#### 11.2.1. Endocrine disrupting properties

Adverse health effects caused by endocrine disrupting properties

No additional information available

#### 11.2.2. Other information

Potential adverse human health effects and symptoms

No harmful effects are to be expected if used properly.  
The contained ingredients can be harmful, but they are hermetically enclosed in the article and can not be released.  
The dismantling of the article is prohibited.

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general	No harmful effects are to be expected if used properly. The contained ingredients can be harmful, but they are hermetically enclosed in the article and can not be released. The dismantling of the article is prohibited.
Hazardous to the aquatic environment, short-term (acute)	Not classified (Based on available data, the classification criteria are not met)
Hazardous to the aquatic environment, long-term (chronic)	Not classified (Based on available data, the classification criteria are not met)

glycerol trinitrate (55-63-0)	
LC50 - Fish [1]	1.9 – 3.58 mg/l (96 h; Oncorhynchus mykiss; ASTM Designation E 729-80)
EC50 - Crustacea [1]	17.83 mg/l (48 h; Ceriodaphnia dubia; ASTM Designation E 729-80)
EC50 96h - Algae [1]	1.15 mg/l (Raphidocelis subcapitata; EPA TSCA Experimental Method 797.1060)
NOEC chronic fish	0.03 mg/l
NOEC chronic crustacea	3.23 mg/l (7 d; Ceriodaphnia dubia)

Lead styphnate (15245-44-0)	
LC50 - Fish [1]	0.107 mg/l (96 h; Oncorhynchus mykiss; Lead)
EC50 - Crustacea [1]	7 mg/l
NOEC chronic fish	0.0189 – 1.559 mg/l (Fish; Lead)
NOEC chronic crustacea	0.0017 – 0.496 mg/l (aquatic invertebrates; Lead)

Barium nitrate (10022-31-8)	
EC50 - Crustacea [1]	9018 mg/l

zinc (7440-66-6)	
LC50 - Fish [1]	169 µg/l (96h; Oncorhynchus Mykiss)
EC50 - Crustacea [1]	< 0.1 µg/l (48h; Ceriodaphnia dubia)
ErC50 algae	0.15 mg/l
NOEC chronic fish	26 µg/L (30 d; Jordanella floridae)
NOEC chronic crustacea	48 µg/L (21d; Daphnia magna; (OECD 211 method))

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Diphenylamine (122-39-4)	
EC50 - Crustacea [1]	2 mg/l (48 h; Daphnia magna; (OECD 202 method))
EC50 72h - Algae [1]	2.17 mg/l (Raphidocelis subcapitata; (OECD 201 method))
NOEC chronic algae	0.0273 mg/l

tetrazene (109-27-3)	
EC50 - Crustacea [1]	0.14 mg/l

### 12.2. Persistence and degradability

DX-Cartridge	
Persistence and degradability	Not established.

glycerol trinitrate (55-63-0)	
Persistence and degradability	Inherently biodegradable.
Biodegradation	92.2 % (84 h)

zinc (7440-66-6)	
Persistence and degradability	Not applicable for inorganic products.

Diphenylamine (122-39-4)	
Persistence and degradability	Not readily biodegraded.
Biodegradation	26 % (28 d; (OECD 301D method))

### 12.3. Bioaccumulative potential

DX-Cartridge	
Bioaccumulative potential	Not established.

glycerol trinitrate (55-63-0)	
Bioaccumulative potential	Low bioaccumulation potential (Log Kow < 4).

Lead styphnate (15245-44-0)	
BCF - Fish [1]	1.553
Partition coefficient n-octanol/water (Log Kow)	-2.19 (20 °C)

zinc (7440-66-6)	
Bioaccumulative potential	Bioaccumulation unlikely.

Diphenylamine (122-39-4)	
Partition coefficient n-octanol/water (Log Kow)	3.82 (20,2 °C)
Bioaccumulative potential	Low bioaccumulation potential (Log Kow < 4).

### 12.4. Mobility in soil

glycerol trinitrate (55-63-0)	
Ecology - soil	Low potential for adsorption in soil.

Diphenylamine (122-39-4)	
Surface tension	72.3 mN/m (20 °C; EU Method A.5)

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### 12.5. Results of PBT and vPvB assessment

DX-Cartridge
This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

### 12.6. Endocrine disrupting properties

No additional information available

### 12.7. Other adverse effects

Other adverse effects	No additional information available
Additional information	Avoid release to the environment.





## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Regional waste regulation	Disposal must be done according to official regulations.
Product/Packaging disposal recommendations	Dispose in a safe manner in accordance with local/national regulations. Refer to manufacturer/supplier for information on recovery/recycling. At high temperatures may form : Response.
Additional information	Cartridge strips with unused cartridges: Hazardous waste due to risk of explosion. European waste catalogue: 16 04 01* - waste ammunition. If possible use up the cartridges or store them for your next project. If not possible to use up the cartridges - The strip is mixed municipal waste and the cartridge itself is "waste ammunition" and has to be disposed of by an authorized/certified company. If cartridges are used up: European waste catalogue: 20 03 01 - mixed municipal waste . The product (cartridges and strip) can be disposed of as household or factory waste. Avoid release to the environment.
Ecological waste information	16 04 01* - waste ammunition
European List of Waste (LoW, EC 2000/532)	

## SECTION 14: Transport information

In accordance with ADR / IMDG / IATA / RID

ADR	IMDG	IATA	RID
<b>14.1. UN number or ID number</b>			
UN 0323	UN 0323	UN 0323	UN 0323
<b>14.2. UN proper shipping name</b>			
CARTRIDGES, POWER DEVICE	CARTRIDGES, POWER DEVICE	Cartridges, power device	CARTRIDGES, POWER DEVICE
<b>Transport document description</b>			
UN 0323 CARTRIDGES, POWER DEVICE, 1.4S, (E)	UN 0323 CARTRIDGES, POWER DEVICE, 1.4S	UN 0323 Cartridges, power device, 1.4S	UN 0323 CARTRIDGES, POWER DEVICE, 1.4S
<b>14.3. Transport hazard class(es)</b>			
1.4S	1.4S	1.4S	1.4S
			

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ADR	IMDG	IATA	RID
<b>14.4. Packing group</b>			
Not applicable	Not applicable	Not applicable	Not applicable
<b>14.5. Environmental hazards</b>			
Dangerous for the environment: No	Dangerous for the environment: No Marine pollutant: No	Dangerous for the environment: No	Dangerous for the environment: No
No supplementary information available			

### 14.6. Special precautions for user

#### Overland transport

Classification code (ADR)	1.4S
Special provisions (ADR)	347
Limited quantities (ADR)	0
Excepted quantities (ADR)	E0
Packing instructions (ADR)	P134, LP102
Mixed packing provisions (ADR)	MP23
Transport category (ADR)	4
Special provisions for carriage - Loading, unloading and handling (ADR)	CV1, CV2, CV3
Special provisions for carriage - Operation (ADR)	S1
Tunnel restriction code (ADR)	E

#### Transport by sea

Special provisions (IMDG)	347
Limited quantities (IMDG)	0
Excepted quantities (IMDG)	E0
Packing instructions (IMDG)	P134, LP102
EmS-No. (Fire)	F-B
EmS-No. (Spillage)	S-X
Stowage category (IMDG)	01
Stowage and handling (IMDG)	SW1
Flash point (IMDG)	
Properties and observations (IMDG)	See glossary of terms in appendix B.
MFAG-No	114

#### Air transport

PCA Excepted quantities (IATA)	E0
PCA Limited quantities (IATA)	Forbidden
PCA limited quantity max net quantity (IATA)	Forbidden
PCA packing instructions (IATA)	134
PCA max net quantity (IATA)	25kg
CAO packing instructions (IATA)	134
CAO max net quantity (IATA)	100kg
Special provisions (IATA)	A165, A802
ERG code (IATA)	3L

#### Rail transport

Classification code (RID)	1.4S
Special provisions (RID)	347
Limited quantities (RID)	0
Excepted quantities (RID)	E0
Packing instructions (RID)	P134, LP102
Mixed packing provisions (RID)	MP23

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Transport category (RID)	4
Special provisions for carriage – Packages (RID)	W2
Special provisions for carriage - Loading, unloading and handling (RID)	CW1
Colis express (express parcels) (RID)	CE1
Hazard identification number (RID)	1.4S

### 14.7. Maritime transport in bulk according to IMO instruments

Not applicable

## SECTION 15: Regulatory information

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

#### 15.1.1. EU-Regulations

##### REACH Annex XVII (Restriction List)

EU restriction list (REACH Annex XVII)		
Reference code	Applicable on	Entry title or description
3(a)	glycerol trinitrate	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 2.1 to 2.4, 2.6 and 2.7, 2.8 types A and B, 2.9, 2.10, 2.12, 2.13 categories 1 and 2, 2.14 categories 1 and 2, 2.15 types A to F
3(b)	glycerol trinitrate	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 3.1 to 3.6, 3.7 adverse effects on sexual function and fertility or on development, 3.8 effects other than narcotic effects, 3.9 and 3.10
3(c)	glycerol trinitrate	Substances or mixtures fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard class 4.1
30.	Lead styphnate	Substances which are classified as reproductive toxicant category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 5 or Appendix 6, respectively.
63.	Lead styphnate	Lead and its compounds
72.	Lead styphnate	The substances listed in column 1 of the Table in Appendix 12

##### REACH Annex XIV (Authorisation List)

Contains no substance(s) listed on REACH Annex XIV (Authorisation List)

##### REACH Candidate List (SVHC)

Contains substance(s) listed on the REACH Candidate List in concentrations  $\geq 0.1\%$  or SCL: Lead styphnate (EC 239-290-0, CAS 15245-44-0)

##### PIC Regulation (Prior Informed Consent)

Contains substance(s) listed on the PIC list (Regulation EU 649/2012 concerning the export and import of hazardous chemicals): lead 2,4,6-trinitro-m-phenylene dioxide (15245-44-0), Diphenylamine (122-39-4)

##### POP Regulation (Persistent Organic Pollutants)

Contains no substance(s) listed on the POP list (Regulation EU 2019/1021 on persistent organic pollutants)

##### Ozone Regulation (1005/2009)

Contains no substance(s) listed on the Ozone Depletion list (Regulation EU 2024/590 on substances that deplete the ozone layer)

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### Seveso Directive (Disaster Risk Reduction)

Seveso III Part I (Categories of dangerous substances)	Qualifying quantity (tonnes)	
	Lower-tier	Upper-tier
P1b EXPLOSIVES Explosives, Division 1.4	50	200

### Explosives Precursors Regulation (EU 2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)

### Drug Precursors Regulation (EC 273/2004)

Contains no substance(s) listed on the Drug Precursors list (Regulation EC 273/2004 on the manufacture and the placing on market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

#### 15.1.2. National regulations

No additional information available

### 15.2. Chemical safety assessment

No chemical safety assessment has been carried out

## SECTION 16: Other information

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Abbreviations and acronyms:	
CAS-No.	Chemical Abstract Service number
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	Acute Toxicity Estimate
CLP	Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
DNEL	Derived-No Effect Level
EC50	Median effective concentration
ED	Endocrine disruptor
EC-No.	European Community number
EN	European Standard
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
IOELV	Indicative Occupational Exposure Limit Value
LC50	Median lethal concentration
LD50	Median lethal dose
NOEC	No-Observed Effect Concentration
OECD	Organisation for Economic Co-operation and Development
N.O.S.	Not Otherwise Specified
OEL	Occupational Exposure Limit



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Abbreviations and acronyms:	
PBT	Persistent Bioaccumulative Toxic
PNEC	Predicted No-Effect Concentration
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SDS	Safety Data Sheet
STP	Sewage treatment plant
TLM	Median Tolerance Limit
TRGS	Technical Rules for Hazardous Substances
VOC	Volatile Organic Compounds
WGK	Water Hazard Class
vPvB	Very Persistent and Very Bioaccumulative
NOAEL	No-Observed Adverse Effect Level
NOAEC	No-Observed Adverse Effect Concentration
LOAEL	Lowest Observed Adverse Effect Level

Data sources

Supplier Safety Data Sheet. European Chemicals Agency, <http://echa.europa.eu/>.

Full text of H- and EUH-statements:	
Acute Tox. 1 (Dermal)	Acute toxicity (dermal), Category 1
Acute Tox. 2 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 2
Acute Tox. 2 (Oral)	Acute toxicity (oral), Category 2
Acute Tox. 3 (Dermal)	Acute toxicity (dermal), Category 3
Acute Tox. 3 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 3
Acute Tox. 3 (Oral)	Acute toxicity (oral), Category 3
Acute Tox. 4 (Inhalation)	Acute toxicity (inhal.), Category 4
Acute Tox. 4 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 4
Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Aquatic Acute 1	Hazardous to the aquatic environment – Acute Hazard, Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment – Chronic Hazard, Category 1
Aquatic Chronic 2	Hazardous to the aquatic environment – Chronic Hazard, Category 2
Aquatic Chronic 3	Hazardous to the aquatic environment – Chronic Hazard, Category 3
Carc. 2	Carcinogenicity, Category 2
Expl. 1.1	Explosives, Division 1.1
Expl. 1.4	Explosives, Division 1.4
Eye Irrit. 2	Serious eye damage/eye irritation, Category 2

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Full text of H- and EUH-statements:	
Ox. Sol. 2	Oxidising Solids, Category 2
Repr. 1A	Reproductive toxicity, Category 1A
STOT RE 2	Specific target organ toxicity – Repeated exposure, Category 2
Unst. Expl.	Explosives, Unstable explosives
H200	Unstable explosives.
H201	Explosive; mass explosion hazard.
H204	Fire or projection hazard.
H272	May intensify fire; oxidiser.
H300	Fatal if swallowed.
H301	Toxic if swallowed.
H302	Harmful if swallowed.
H310	Fatal in contact with skin.
H311	Toxic in contact with skin.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H331	Toxic if inhaled.
H332	Harmful if inhaled.
H351	Suspected of causing cancer.
H360Df	May damage the unborn child. Suspected of damaging fertility.
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.
H411	Toxic to aquatic life with long lasting effects.
H412	Harmful to aquatic life with long lasting effects.

SDS EU HILTI