



Pacific Scientific Energetic Materials Co.

<<<<< MATERIAL SAFETY DATA SHEET >>>>>

1. **CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

PRODUCT NAME: Cartridge Assembly

TRADE NAME(S) / SYNONYM(S): aircraft fire extinguisher (FIREX) cartridge; BNCP "32 - 10" FIREX or pressure cartridge; *cartridges, power device {USDOT}*

NATIONAL STOCK NUMBER (NSN): not yet determined

PRODUCT / PART NUMBER(S): **2-103210-1 [30903975]**
2-101944-1 (In-house s/a, w/o protective features)

MSDS NUMBER / SPECIFYING LETTER: 00233 OO

REVISION DATE: 15 January 2008

SHIPPING REFERENCE NUMBER: US DOT Competent Authorities:
EX2001060015 [PSEMC-AZ packaging - 1.4C]
{pending} [PS/HTL-Kintech packaging - 1.4S]

MANUFACTURER: Danaher Corporation - Pacific Scientific Energetic Materials Co. [PSEMC-AZ]
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TELEPHONE NUMBERS: (480) 763-3000 [6am-4pm MST]
(520) 796-1243 FAX
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[website - www.psemc.com]

2. **COMPOSITION / INFORMATION ON INGREDIENTS**

NET EXPLOSIVE WEIGHT (NEW): 342 mg maximum

HAZARDOUS INGREDIENTS

The following table contains the hazardous materials that are below the required reporting levels per OSHA, 29 CFR § 1900.1200 (< 1 % or < 0.1 %, if carcinogenic):

| COMPONENT NAME | CAS NO. | COMPONENT NAME | CAS NO. |
|-------------------------------|------------|---|-------------|
| zirconium [Zr] (metal powder) | 7440-67-7 | difluoroethene-hexafluoropropene-tetrafluoroethene terpolymer | 25190-89-0 |
| potassium perchlorate [KP] | 7778-74-7 | | |
| graphite [C] | 7782-42-5 | tetraammine- <i>cis-bis</i> (5-nitro-2H-tetraazolato-N ²) cobalt ^{III} | 178959-25-6 |
| hexanitrostilbene (HNS) | 20062-22-0 | perchlorate (BNCP) | |

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3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING: Explosive Product ! Do not attempt to manually fight fires. Product may be sensitive to shock, impact, friction, electrostatic discharge, high pressure or high temperature. Product may ignite and explode if exposed to any of these conditions, releasing toxic fumes, heat, shock waves and container fragments.

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

EYES: The product is sealed preventing exposure to the hazardous ingredients inside. If product seal ruptures exposing hazardous ingredients inside, discard product avoiding contact with the eyes. Exposure to ignition products may cause eye irritation.

SKIN: The product is sealed preventing exposure to the hazardous ingredients inside. If product seal ruptures, discard product avoiding contact with the skin. Poses little or no immediate hazard. Exposure to ignition products may cause skin irritation.

INHALATION: The product is sealed preventing exposure to the hazardous ingredients inside. Exposure to ignition products may cause respiratory irritation. Ignition products will contain zirconium, cobalt, chlorine and fluorine compounds, plus nitrogen oxides.

INGESTION: Not a hazard in normal industrial use. If product seal ruptures, discard product using proper protection. Some ingredients are highly poisonous by ingestion.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing pulmonary diseases such as emphysema, asthma, etc. may be aggravated by overexposure to ignition products.

CARCINOGENICITY (CANCER) LISTING STATUS

OSHA, NTP & NIOSH: Neither the product nor its hazardous components are listed

IARC: 2B - Limited Evidence [cobalt compound]

ACGIH: A3 - Animal Carcinogen [inorganic cobalt compound, as cobalt]

REFER TO SECTION 11, TOXICOLOGICAL INFORMATION, FOR ADDITIONAL DATA.

4. FIRST AID MEASURES

EYES: If exposed to container fragmentation, bandage eyes and transport. If exposed to ignition byproducts, remove contact lenses immediately, flush with water for at least 15 minutes, occasionally lifting upper and lower eyelids. Seek medical attention if needed.

SKIN: Wash off any residue with soap and warm water. Seek medical attention if irritation develops.

INHALATION: Remove to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, administer oxygen. Seek immediate medical attention.

INGESTION: Seek immediate medical attention.

NOTE TO PHYSICIAN: Supportive care. Product ignition produces small quantities of zirconium, cobalt, chlorine and fluorine compounds, plus nitrogen oxides. Treatment based on judgement of the physician in response to reactions of the patient.

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5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: not applicable

METHOD USED: not applicable

LOWER FLAMMABLE LIMIT: self-oxidizing

UPPER FLAMMABLE LIMIT: self-oxidizing

AUTOIGNITION TEMPERATURE: $\geq 480^{\circ}\text{F}$ ($\geq 250^{\circ}\text{C}$) [BNCP]

FIRE AND EXPLOSION HAZARD: WARNING - Explosive Product ! Product may be sensitive to shock, impact, friction, electrostatic discharge, high pressure or high temperature. Must not be confined if burning. Product may deflagrate or detonate if exposed releasing toxic fumes, heat, shock waves and container fragments.

EXTINGUISHING MEDIA: Permanently-installed, automatic water sprinkler / deluge system is recommended.

FIRE FIGHTING INSTRUCTIONS: Do not attempt to manually fight fires. In case of fire, personnel should immediately evacuate the area, using as much protective cover as possible and activate deluge and alarm systems.

HAZARDOUS COMBUSTION PRODUCTS: Extreme heat and toxic gases containing zirconium, cobalt, chlorine and fluorine compounds; plus nitrogen oxides may be emitted during ignition.

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILL: If product seal ruptures, barricade area, eliminate ignition sources, use a soft bristle brush and a conductive rubber pan or rubber shovel to clean-up spills. Use conductive containers and ground all containers when transferring the spilled material. Refer to Section 9 for the proper desensitizing agent to wet and desensitize the spilled material.

LARGE SPILL

SOIL SPILL: Remove all contaminated soil to dispose of as hazardous waste.

AIR RELEASE: Not applicable

WATER SPILL: Flush with copious amounts of water. Collect water to dispose of as hazardous waste.

OCCUPATIONAL SPILL: If product seal ruptures, barricade area and eliminate ignition sources. Refer to SMALL SPILL above.

7. HANDLING AND STORAGE

HANDLING: Handling and use of explosives and related dangerous materials must be limited to personnel who are specifically authorized and trained in this area. Refer to the Department of Defense Contractors Safety Manual number DOD4145.26M, including sources listed within, and any other appropriate information for detailed instructions regarding proper handling, storage, use and disposal of explosives and related dangerous material.

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STORAGE: Store in approved storage magazines only. Storage and handling must conform to appropriate quantity / distance requirements, barricading, grounding and personnel material limits. Keep product cool and dry in storage.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT (PPE)

EYE PROTECTION: Industrial safety glasses or goggles must be worn when handling any type of explosive product.

SKIN PROTECTION

GLOVES: Impervious, static-dissipative gloves are recommended if product seal ruptures.

CLOTHING: High cotton-content clothing and underclothing, as well as conductive shoes or legstat(s), wristat(s) and a static-dissipative coat, are recommended to avoid static electricity build-up.

EMERGENCY WASH FACILITY: Eye washing capability is required.

RESPIRATORY PROTECTION: Appropriate NIOSH-approved respiratory protection is recommended if exposed to particulate matter, and, for protection against toxic gaseous ignition products, but should not be necessary with normal handling.

OTHER PROTECTION: None indicated.

ENGINEERING CONTROLS: Effective shielding is recommended for personnel when handling these devices. Humidity control (i.e. higher relative humidity, > 60% as recommended by DOD) reduces or prevents static electricity build-up. Explosion-proof equipment is required when operating with exposed explosive materials.

VENTILATION

LOCAL: Not required.

SPECIAL: Explosion-proof electrical is required, where applicable.

MECHANICAL: General-coverage, moderate-flow, is recommended for particulate and ignition product removal.

EXPOSURE GUIDELINES:

Measurable exposure is not likely for this product in normal handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

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|------------------------|--------------------------------|
| APPEARANCE: | metallic ordnance hardware |
| ODOR: | odorless |
| PHYSICAL STATE: | solid |
| pH @ 25EC: | not determined |
| VAPOR PRESSURE: | not applicable, sealed product |
| VAPOR DENSITY: | not applicable, sealed product |
| BOILING POINT: | not applicable |

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| MELTING POINT: | not applicable |
| SOLUBILITY IN H₂O: | negligible |
| SPECIFIC GRAVITY (H₂O=1): | greater than 1 |
| BULK DENSITY: | greater than 1, identical to specific gravity |
| CHEMICAL FAMILY: | not applicable |
| MOLECULAR WEIGHT: | not applicable |
| MOLECULAR FORMULA: | not applicable |
| VISCOSITY: | not applicable |
| EVAPORATION RATE: | not applicable, sealed product |
| DECOMPOSITION TEMP: | >/= 480°F (>/= 250°C) by auto-ignition [BNCP] |
| DESENSITIZING AGENT: | <u>CAUTION:</u> The product may only be desensitized if large volumes of water or mineral oil come in contact with the explosive components inside. Sealed units should be shunted and disposed of in accordance with Section 13. |
| VOC CONTENT: | negligible |

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: This explosive product is stable if handled properly. Avoid conditions listed below.

CONDITIONS TO AVOID: Shock, impact, friction, electrostatic discharge, high pressure, high temperature, open flame and chemical or physical contamination.

INCOMPATIBILITY WITH OTHER MATERIALS: The product is sealed preventing exposure to the hazardous ingredients inside. If the seal ruptures, remove all other hazardous material.

HAZARDOUS DECOMPOSITION PRODUCTS: Extreme heat and toxic gases containing zirconium, cobalt, chlorine and fluorine compounds, plus nitrogen oxides may be emitted during ignition.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

HEALTH HAZARDS / TOXICOLOGY: The product is sealed preventing exposure to the hazardous ingredients inside. If the seal ruptures, remove all other hazardous materials. The small quantities of the hazardous components involved in each device is unlikely to cause any chronic health effects or even notable acute effects, if released.

12. ECOLOGICAL INFORMATION

The product is sealed preventing exposure to the hazardous ingredients inside. If the seal ruptures, the small amount of hazardous ingredients inside should have no ecological impact.

13. DISPOSAL CONSIDERATIONS

RCRA HAZARDOUS WASTE CODES (product as manufactured):

D003 - reactive characteristic

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WASTE DISPOSAL METHOD: Explosives or related dangerous material should be destroyed by open burning / open detonation in an approved incinerator, or by another approved method such as chemical treatment / destruction. Contaminated property must not be buried.

REGULATIONS GOVERNING TREATMENT, STORAGE AND DISPOSAL OF HAZARDOUS WASTE IS SUBJECT TO CHANGE AND REINTERPRETATION. SINCE THE OWNER OF THE WASTE IS RESPONSIBLE FOR PROPER DISPOSAL, CHECK WITH FEDERAL, STATE AND LOCAL ENVIRONMENTAL AGENCIES IF IN DOUBT OF THE REQUIREMENTS OF APPLICABLE LAWS, RULES AND REGULATIONS. TREATMENT, STORAGE AND DISPOSAL MUST BE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS, RULES AND REGULATIONS.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION INFORMATION: This product is regulated as a US DOT Hazardous Material. Applicable regulations are found in title 49 of the Code of Federal Regulations. An authorized carrier in full compliance with these regulations must be used to transport this product. This product may not be mailed through the US Postal system.

using EX2001060015 (or formerly EX-0106015):

UN PROPER SHIPPING NAME / NUMBER: Cartridges, power device / UN0276
UN CLASSIFICATION CODE: 1.4C
PACKAGING GROUP: II
LABEL(S) REQUIRED: EXPLOSIVE 1.4C, CARGO AIRCRAFT ONLY

~~using EX2002030115, w/ Duarte special (distributor's) packaging:~~

~~**UN PROPER SHIPPING NAME / NUMBER:** Cartridges, power device / UN0323
UN CLASSIFICATION CODE: 1.4S
PACKAGING GROUP: II
LABEL(S) REQUIRED: EXPLOSIVE 1.4S~~

for both classifications above:

APPLICABLE PACKAGING SECTION: 49 CFR § 173.62 non-bulk [PI-134], plus special provision 110 per 49 CFR § 172.102 and notes on the shipping approval.

DOT REPORTABLE QUANTITY (RQ): 100 lbs. (45.4 kg) per 49 CFR § 172.101, Appendix [D003 reactivity]

OTHER TRANSPORTATION INFORMATION: For general emergency response guidance, actions, and potential hazards, refer to the current "Emergency Response Guidebook" (ERG), **GUIDE NUMBER 114.**

NOTE: For all BNCP FIREX products previously classified as fuzes, detonating, UN0410, 1.4D, most of those shipping approvals have been superseded, except for part numbers 2-102750-1, 2-102760-1, 2-101200-1 and 2-101200-2.

15. REGULATORY INFORMATION

U.S. REGULATIONS FEDERAL

OSHA: Regulated under 29 CFR § 1910.1200

TSCA: As a sealed device, TSCA listing is not required.

CERCLA RQ: 100 lbs. (45.4 kg) [D003 reactivity]

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SARA - SECTION 302 TPQ: Not an Extremely Hazardous Substance.
- SECTION 304 RQ: See CERCLA RQ.
- SECTION 313: Reportable [cobalt compound]

STATES

CALIFORNIA PROPOSITION 65: The product and its hazardous components are not on their list.

NEW JERSEY RIGHT-TO-KNOW: The product (as EXPLOSIVES C) and the components, zirconium, potassium perchlorate, HNS and BNCP (as a cobalt compound and a perchlorate, inorganic, n.o.s.), are on the Right-to-Know Hazardous Substance List (rev. 3/93), which consists of both the Workplace Hazardous Substance List and the Environmental Hazardous Substance List. Zirconium and potassium perchlorate are on the Special Health Hazard Substance List.

PENNSYLVANIA RIGHT-TO-KNOW: The components that are listed, zirconium, potassium perchlorate, graphite and BNCP (as a cobalt compound), are on the Hazardous Substance List. Cobalt compounds are included as Environmental Hazards. None are included as Special Hazardous Substances.

INTERNATIONAL REGULATIONS

CANADA: This product may required to be on the List of Authorized Explosives and the importing entity may have to acquire a permit to import the device from the Explosives Regulatory Division (ERD), part of the CANMET Mineral Technology Branch within the Minerals and Metals Sector of Natural Resources Canada (NRCan).

OTHERS: This product may be shipped to and through the Europe Union (EU). Attach *ADDENDUM FOR EUROPEAN AND TRANS-EUROPEAN SHIPMENT* to satisfy any CE certification requirements.

Note: Customers and distributors are recommended to develop User Manuals in the languages of the nations where this device will be used to better cover safe handling, storage and disposal, per the regulatory requirements of their nations.

16. OTHER INFORMATION**HMIS RATINGS (Sealed product rating):**

HEALTH: 1 FLAMMABILITY: 0 REACTIVITY: 4
PERSONAL PROTECTION: A + X

REVISION HISTORY

Initial issue: 24 June 99, ANSI Z400.1

PREPARED BY: J. Geving - Environmental, Health & Safety [(480) 763-3043, jgeving@psemc.com]

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