

Material Safety Data Sheet

Material Name: PENNCOAT® 401 HARDENER

IDs:

*** Section 1 - Chemical Product and Company Identification ***

Product Trade Name PENNCOAT 401 HARDENER

Manufacturer Information

Ergon Armor (601) 933-3540
Corrosion Engineering
P.O. Box 1639 (800) 424-9300
Jackson, MS 39215-1639

*** Section 2 - Composition / Information on Ingredients ***

CAS #	Component	Percent	OSHA
1761-71-3	Cyclohexanamine, 4,4'-methylenebis-	50-70	Yes
111-40-0	Diethylenetriamine	20-30	Yes
108-95-2	Phenol	5-15	Yes

The substance(s) marked with a "Y" in the OSHA column, are identified as hazardous chemicals according to the criteria of the OSHA Communication Standard (29 CFR 1910.1200)

The components of this product are all on the TSCA inventory list.

*** Section 3 - Hazards Identification ***

Emergency Overview:

Amber liquid with an amine odor

DANGER!

CAUSES EYE AND SKIN BURNS. MAY CAUSE BLINDNESS.

MAY CAUSE ALLERGIC SKIN AND RESPIRATORY REACTIONS HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.

CONTAINS PHENOL WHICH CAUSES BLOOD EFFECTS AND LIVER DAMAGE. PROLONGED EXPOSURE TO HIGH VAPOR CONCENTRATIONS CAN CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION INCLUDING HEADACHE, DIZZINESS, WEAKNESS, CONFUSION, NAUSEA, AND LOSS OF CONSCIOUSNESS.

Potential Health Effects:

Phenol

Skin contact and inhalation are expected to be the primary routes of occupational exposure to this material. This material is corrosive to all tissues. This material can destroy nerve endings and remove the important warning property that the pain response normally provides when tissue destruction is occurring. Contact with skin causes whitening or bleaching (depigmentation) of the exposed area, followed by severe burns which may be delayed. Contact of this material with eyes can cause severe burns which can lead to permanent eye injury and loss of sight. Due to its low volatility, this material usually does not pose a serious respiratory hazard; however, phenol vapor may be irritating to the respiratory tract. Solid, liquid and vapor of this material are readily absorbed through skin in toxic amounts and absorption occurs faster and in larger amounts if a larger surface area is exposed. Skin absorption can occur at low vapor pressures without discomfort. Poisoning can occur after skin absorption, vapor inhalation or ingestion (swallowing). Symptoms of poisoning develop rapidly after exposure and can include central nervous system (CNS) depression with coma, respiratory

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depression and death. Symptoms may also include seizures, bloody diarrhea, paleness, sweating, weakness, ringing in the ears, decreased body temperature, shock, metabolic acidosis, cyanosis (bluish appearance of the skin), cardiovascular collapse, methemoglobinemia (reduced capacity of the blood to carry oxygen), hemolytic anemia and liver and kidney damage. Long-term, low-level poisoning can cause diarrhea and dark urine.

Diethylenetriamine

Inhalation and skin contact are expected to be the primary routes of occupational exposure to this material. Repeated or prolonged skin contact can result in an allergic skin reaction. Overexposure to vapor or mist may be irritating to eyes and respiratory tract and repeated or prolonged exposure can cause an allergic respiratory tract reaction in susceptible individuals. While swallowing of this material is unlikely in the industrial setting, if swallowed this material may cause burns of the mouth, throat and digestive tract. This material is considered, on the basis of single exposure (acute) animal tests, to be slightly toxic if ingested (swallowed), moderately to slightly toxic if absorbed through skin and corrosive to eyes and skin. Due to the potential for this material to cause irritation and an allergic reaction in the respiratory tract, workers with lung disease or diminished respiratory capacity should have limited exposure to this material.

Cyclohexanamine, 4,4'-methylenebis-

Inhalation and skin contact are expected to be the primary routes of occupational exposure to this material. Based on single exposure animal tests, this material is considered to be moderately toxic if swallowed, corrosive to eyes and slightly to moderately irritating to skin. Repeated contact with this material may cause an allergic skin reaction.

* * * Section 4 - First Aid Measures * * *

IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Get medical attention immediately.

IF ON SKIN, immediately wash with soap and plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Destroy contaminated shoes.

IF SWALLOWED, do NOT induce vomiting. Give water to drink. Get medical attention immediately. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

* * * Section 5 - Fire Fighting Measures * * *

Flash Point:	>212 deg F (100 deg C)	Method Used:	TCC	Flammability Classification:
Upper Flammable Limit (UFL):	NE	Lower Flammable Limit (LFL):	NE	

Fire & Explosion Hazards:

Closed containers of this material may explode when subjected to heat from surrounding fire. Cool exposed containers with water. Avoid breathing fumes from fire exposed material.

Extinguishing Media:

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Use water spray, carbon dioxide, foam or dry chemical.

Fire-Fighting Instructions:

Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand NIOSH approved or equivalent). Fire fighting equipment should be thoroughly decontaminated after use.

*** Section 6 - Accidental Release Measures ***

Spill or Leak

Isolate hazard area and deny entry to unnecessary or unprotected personnel. Contain spilled liquid with sand or earth. Clean up spill immediately, observing precautions in the Personal Protection section of MSDS. Avoid runoff into storm sewers and ditches which lead to waterways.

*** Section 7 - Handling and Storage ***

Handling Procedures:

Do not get in eyes, on skin or clothing. Avoid breathing vapor or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Empty container may contain hazardous residues.

Storage Procedures:

Avoid excessive heat. Store out of direct sunlight in a cool, well-ventilated place.

*** Section 8 - Exposure Controls / Personal Protection ***

Component Exposure Limits

Diethylenetriamine (111-40-6)

ACGIH:	TLV-TWA 4.2 mg/m3, 1 ppm
ACGIH (SKIN DESIGNATOR):	Y
NIOSH:	REL-TWA 4 mg/m3, 1 ppm
NIOSH (SKIN DESIGNATOR):	Y

Phenol (108-95-2)

ACGIH:	TLV-TWA 19 mg/m3, 5 ppm
ACGIH (SKIN DESIGNATOR):	Y
OSHA:	PEL-TWA 19 mg/m3, 5 ppm
OSHA (SKIN DESIGNATOR):	Y

-Only those components with exposure limits are printed in this section.

-Skin contact limits designated with a "Y" above have skin contact effect. Air sampling alone is insufficient to accurately quantitate exposure. Measures to prevent significant cutaneous absorption may be required.

-ACGIH Sensitizer designator with a value of "Y" above means that exposure to this material may cause allergic reactions.

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Engineering Controls:

Investigate engineering techniques to reduce exposures below airborne exposure limits. Provide ventilation if necessary to control exposure levels below airborne exposure limits (see above). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment. Consult ACGIH ventilation manual or NFPA Standard 91 for design of exhaust systems.

PERSONAL PROTECTIVE EQUIPMENT

As prescribed in the OSHA Standard for Personal Protective Equipment (29 CFR 1910.132), employers must perform a Hazard Assessment of all workplaces to determine the need for, and selection of, proper protective equipment for each task performed.

Eyes/Face Protective Equipment:

Where there is potential for eye contact, wear chemical goggles and have eye flushing equipment available.

Skin Protection:

Neoprene or Polyvinyl chloride gloves should be worn when handling this material. Wear face shield and chemical resistant clothing such as a rubber apron when splashing may occur. Wash contaminated clothing and clean protective equipment before reuse. Rinse contaminated skin promptly. Wash skin thoroughly after handling.

Respiratory Protection:

Avoid breathing vapor or mist. When airborne exposure limits are exceeded (see above), use NIOSH approved respiratory protection equipment appropriate to the material and/or its components. Consult respirator manufacturer to determine appropriate type equipment for given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where exposure limit may be significantly exceeded, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR § 1910.134.

*** Section 9 - Physical & Chemical Properties ***

Physical State:	Liquid	Appearance:	Yellow-amber liquid
Odor:	Amine	Vapor Pressure:	<1 mg/Hg @ 20 deg C
Vapor Density:	Heavier than air	Boiling Point:	>600 deg F
Melting Point:	N/E	Specific Gravity:	1.04 @ 25/25 Deg C
pH:	N/A	Viscosity:	NE
VOC:	<1%	Solubility Water:	insoluble

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability:

This material is chemically stable under normal and anticipated storage and handling conditions.

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Incompatibility:

Avoid contact with strong acids, alkalis, oxidizers, copper, copper alloys, chlorinated compounds and epoxy resins (in uncontrolled conditions).

Decomposition Products:

Oxides of carbon and nitrogen.

Hazardous Polymerization:

Hazardous polymerization is not known to occur.

*** Section 11 - Toxicological Information ***

Acute Toxicity:

A: General Product Information

No information available for the product.

B: Component Analysis –

Data on this material and/or its components are summarized below.

Phenol

Single exposure (acute) studies indicate that this material is moderately toxic to rats if swallowed (LD50 317- 650 mg/kg), moderately to slightly toxic to rabbits if absorbed through skin (LD50 850-1,400 mg/kg), and corrosive to rabbit eyes and skin. The lethal oral dose in adult humans is reported to be 140-430 mg/kg. Following repeated inhalation exposure to 26 ppm phenol for 3-5 days, tremors, twitching and disturbances in walking rhythm and posture were reported in rats. Following repeated inhalation exposure to vapor of this material, guinea pigs and rabbits exhibited some injury to heart tissue, while rats, mice and rhesus monkeys showed no abnormalities of the heart. Hind limb paralysis was reported in guinea pigs, while rabbits and rats did not exhibit this symptom. Decreased weight gain was observed following administration of this material in the drinking water of mice and rats at levels up to 10,000 ppm for 13-weeks. Following continuous administration in the drinking water for 103 weeks at levels up to 5000 ppm, of this material was not considered carcinogenic to mice and rats. This material has shown tumor promotion in mouse skin painting assays. No birth defects were noted in the offspring of rats and mice given phenol in their drinking water during pregnancy. Reduced fetal weight was observed in both species and adverse effects on the mother were noted in mice. This material administered in the drinking water of rats for multiple generations produced increased death of offspring at birth, decreased reproduction and eventual cessation of reproduction at the highest dose level. This material has generally produced no genetic changes in standard tests using bacterial cells; however, positive and negative results have been reported from tests using animals and animal cells.

This material is rapidly distributed to tissues in animals within 15 minutes of oral dosing, with the highest concentrations found in the liver, followed by the heart, kidney, lungs, blood and muscle. The concentration of this material in rats was consistently greater in the liver, spleen, kidney, adrenal gland, thyroid glands and lungs than in blood plasma. There is considerable species variation on the metabolism of this material. Humans dosed orally with this material excreted

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almost all the compound in the urine as phenol glucuronide and sulfate conjugates. Following inhalation of vapor of this material at levels of 6-20 mg/m³ for 8 hours, humans excreted almost all of the absorbed material in their urine within 24 hours. Similar results were noted in humans exposed dermally to an aqueous solution of phenol for 30 minutes. Human studies have shown that vapor of this material is absorbed through the skin at a rate somewhat slower than by inhalation but proportional to the concentration of the vapor in the air. Following an accidental spill of a solution of this material on the scalp, face, neck, shoulders and back, a 32-year old male died within ten minutes. He exhibited effects on the skin, lungs, liver, spleen and kidneys.

Diethylenetriamine

Single exposure (acute) studies indicate that this material is slightly toxic to rats if swallowed (LD₅₀ 1,080-2,330 mg/kg), moderately to slightly toxic to rabbits if absorbed through skin (LD₅₀ 670-1,090 mg/kg), and corrosive to rabbit eyes and skin. No deaths were observed in rats exposed to saturated vapor for 8-hours.

Allergic skin and respiratory tract reactions have been observed in humans following repeated exposure to this material. Rats orally administered up to 50,000 ppm for 14-days showed decreased body weight, food consumption and spleen weights. Decreased body weight and increased liver, kidney and brain weights were seen in rats administered up to 1060 mg/kg/day by gavage or 15,000 ppm in the diet daily for 90-days. Lifetime dermal exposure to rats produced effects on the liver, lungs, kidneys, spleen and adrenal glands. No tumors were seen in mice after lifetime dermal application. No adverse effects were observed in the offspring of rats exposed subcutaneously (10 or 50 mg/kg/day) or dermally (0.4 ml) for life. This material has generally produced no genetic changes in standard tests using bacterial and animal cells and animals, although a few positive results have been observed in standard tests using bacterial and animal cells.

Cyclohexanamine, 4,4'-methylenebis-

Single exposure (acute) studies indicate that this material is moderately toxic to rats if swallowed (approximate lethal dose 100 mg/kg), corrosive to rabbit eyes, and slightly to moderately irritating to guinea pig skin. Skin allergies were observed in guinea pigs following repeated skin exposure. Following repeated oral exposure to this material, digestive tract irritation, kidney and liver damage were observed in dogs. This material produced no genetic changes in standard tests using bacterial cells.

Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Chronic Toxicity

No information available for the product.

Epidemiology:

No information available for the product.

Neurotoxicity:

No information available for the product.

Mutagenicity:

No information available for the product.

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Teratogenicity:

No information available for the product.

* * * Section 12 - Ecological Information * * *
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Ecotoxicity:

A: General Product Information

No information available for the product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Data on this material and/or its components are summarized below.

Phenol

24-hr LC50 Daphnia magna: 12-31 mg/l, Slightly Toxic
48-hr LC50 Channel catfish: 31-82 mg/l, Slightly Toxic
96-hr LC50 Rainbow trout: 8.9 mg/l, Moderately Toxic
96-hr LC50 Fathead minnows: 36 mg/l, Slightly Toxic

Diethylenetriamine

24-hr TLm Brine shrimp: 710 mg/l
24-hr TLm Himekida: 1,000 mg/l
48-hr LC50 Daphnia magna: 11.5-17.0 mg/l, Slightly Toxic
48-hr LC50 Golden orfe (static): 100-500 mg/l, Practically Non-toxic
96-hr LC50 Fathead minnow: 258-332 mg/l, Practically Non-toxic
Bacterial Inhibition (IC50): >5,000 mg/l

Environmental Fate:

Data on this material and/or its components are summarized below.

Phenol

This material is rapidly aerobically degraded in water and soil. The octanol/water partition coefficient (log Kow) is 1.46. The theoretical oxygen demand (ThOD) is between 2.26-2.40 g/g. The 20-day biochemical oxygen demand (BOD) has been measure as 2.33 p/p (97.9% ThOD), while the chemical oxygen demand (COD) is 2.38 g/g (KMnO4). The inhibitory concentration (IH50) is 798.9 mg/l.

Diethylenetriamine

This material has a theoretical oxygen demand (ThOD) of 1.55 mg/mg and a chemical oxygen demand (COD) of 1.57 mg/mg. Its 20-day biochemical oxygen demand (BOD) is 0% (non-acclimated) and 70% (acclimated). Due to its high water solubility and low octanol/water partition coefficient (Kow = 0.11), this material is not expected to bioconcentrate.

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*** Section 13 - Disposal Considerations ***

US EPA Waste Numbers & Descriptions:

A: General Product Information

Recover, reclaim or recycle when practical.

Disposal via incineration is recommended. Appropriate pretreatment and disposal in an authorized landfill is acceptable. In all cases, dispose of material in accordance with all applicable federal, state, and local laws and regulations. Consult appropriate regulatory officials or your attorney for information on such disposal.

Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

*** Section 14 - Transportation Information ***

US DOT Information

DOT Name: Polyamines, Liquid, Corrosive, NOS
DOT Technical Name: (Cycloaliphatic Amines)
DOT Hazard Class: 8
UN Number: 2735
DOT Packing Group: PG III

*** Section 15 - Regulatory Information ***

US Federal Regulations

A: General Product Information

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

B: Component Analysis

SARA Title III, Section 313

This product does contain chemical(s) which are defined as toxic chemicals under and subject to the reporting requirements of, Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 986 and 40 CFR Part 372. See Section 2

Phenol

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This product does contain chemical(s) which are defined as toxic chemicals under and subject to the reporting requirements of SARA Section 302 (40 CFR 355 Appendix A or CERCLA (40 CFR 302.4).

Phenol

SARA 311/312: Acute: Y Chronic: Y Fire: N Pressure: N Reactive: N

CERCLA Reportable Quantities (40 CFR 302.4):

Phenol 1000 LBS

State Regulations

A: General Product Information

No additional information available.

B: Component Analysis – State

The following components appear on one or more of the following state hazardous substances lists:

Massachusetts Right to Know

This product does contain the following chemical(s), as indicated below, currently on the Massachusetts Right to Know Substance List.

Diethylenetriamine
Phenol

New Jersey Right to Know

This product does contain the following chemical(s), as indicated below, currently on the New Jersey Right-to-Know Substances List.

Diethylenetriamine
Phenol

Pennsylvania Right to Know

This product does contain the following chemical(s), as indicated below, currently on the Pennsylvania Hazardous Substance List.

Diethylenetriamine
Phenol

Other Regulations

A: General Product Information

All components are on the U.S. EPA TSCA Inventory List.

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B: Component Analysis – Inventory Component Analysis - Inventory

CAS #	Component	TSCA	DSL	EINECS
1761-71-3	Cyclohexanamine, 4,4'-methylenebis-	Yes	Yes	Yes
111-40-0	Diethylenetriamine	Yes	Yes	Yes
108-95-2	Phenol	Yes	Yes	Yes

C: Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Disclosure / Classifications
Diethylenetriamine	111-40-0	0.1% / D2B, E
Phenol	108-95-2	1% / D1A, E

*** Section 16 - Other Information ***

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; NFPA = National Fire Protection Association; HMIS = Hazardous Material Identification System; CERCLA = Comprehensive Environmental Response, Compensation and Liability Act; SARA = Superfund Amendments and Reauthorization Act

The information presented herein is believed to be factual as it has been derived from the works and opinions of persons believed to be qualified experts; however, nothing contained in this information is to be taken as a warranty or representation for which Ergon Armor bears legal responsibility. The user should review any recommendations in the specific context of the intended use to determine whether they are appropriate.