

DUPONT

Material Safety Data Sheet

NOMEX® BRAND PAPER AND PRESSBOARD**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION****MSDS NUMBER:** SP6015**Revision Date:** February 2, 2000**MANUFACTURER/DISTRIBUTOR**

DuPont
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PHONE NUMBERS

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TRADE NAMES/SYNONYMS

NOMEX® Brand Paper
NOMEX® Brand Pressboard
NOMEX® Brand M Aramid Mica Paper
DuPont Aramid Paper



DuPont Advanced Fibers Systems

P.O. Box 27001, Richmond, VA 23261

NOMEX® is a DuPont registered trademark.

2. COMPOSITION/INFORMATION ON INGREDIENTS

MATERIAL	CAS Number	Wt. %
Poly (isophthaloyl chloride/m-phenylenediamine)	25765-47-3	
NOMEX® Paper (non-mica products)		93-100
(Types 418 & 419 mica papers)		43-50
Dimethyl Acetamide (DMAc)	127-19-5	0.1-0.5
Mica (in Types 418 & 419 mica papers)		46-50
Water	7732-18-5	0-7
Antioxidant		0-4

(%WT BASED ON DRY WEIGHT.)

Description of above components:

NOMEX® meta-aramid paper and pressboard are composed principally of a solid organic polymer composed of carbon, oxygen, nitrogen and hydrogen. Mica is added to some papers for improved electrical performance. The polymer contains up to 7% moisture, dependent upon storage and use conditions; a small amount of residual dimethylacetamide (DMAc) from the manufacturing process; and additives in some products designed to enhance specific performance. Those additives present no known hazards in use.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Based on more than 30 years of experience in commercial use and extensive toxicological testing, NOMEX® brand paper and pressboard present minimal risk to human health and the environment.

As shipped, NOMEX® paper and pressboard do not pose a hazard. When mechanically working these products, some dust may be generated. The dust generated by processing some products will contain mica dust, which can cause eye irritation, coughing and sneezing. Repeated excessive exposures may cause chronic lung disorders. Use adequate ventilation.

When NOMEX® paper and pressboard are processed at elevated temperatures, the residual DMAc may be volatilized and accumulate in poorly ventilated areas. Over-exposure to DMAc by inhalation, ingestion, skin or eye contact may initially cause nausea, headache or weakness and can cause abnormal liver and kidney function. Wash hands after handling. Avoid personnel exposure to hot processing in confined spaces. Use adequate ventilation.

Because the remaining DMAc concentration is low and because the DMAc is not readily released from the paper below 200 degrees C, hazardous exposure to DMAc under normal operating conditions is unlikely.

During a fire, burning NOMEX® paper and pressboard may release toxic and irritating gases, much like wool. NOMEX® will burn only with added heat, but dust may smolder.

NOMEX® brand paper and pressboard are non-biodegradable and nontoxic to aquatic life; they pose no unusual environmental hazard in a spill or fire.

POTENTIAL HEALTH EFFECTS:

EYE

Paper fly and dust may cause slight mechanical irritation. Polymer of NOMEX® is untested for eye irritancy. Mica-containing dust may irritate the eyes.

SKIN

Based on animal and human skin patch tests, NOMEX® does not cause sensitization (allergic reaction) and has little potential for skin irritation. Continual rubbing of paper debris on the skin, as when it is trapped under cuffs or collar, or constantly handling paper edges may cause skin irritation. Mica-containing dust may irritate the skin.

INGESTION

Based on animal studies, polymer of NOMEX® and mica-containing dust is nontoxic when eaten.

INHALATION

NOMEX® fibers in paper are too big to inhale into the lungs, but dust and fly from processing paper may be breathed into the nose and throat. Working unprotected in dusty conditions may cause upper respiratory irritation and cold-like symptoms.

CHRONIC EFFECTS

Processing NOMEX® paper and paperboard may create dust in the air small enough to be breathed into the lungs. Paper dust instilled into the lungs of rats produced no permanent lung damage. Repeated excessive exposures to mica-containing dust may cause chronic lung disorders.

CARCINOGENICITY INFORMATION

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

4. FIRST AID MEASURES

INHALATION

If exposed to excess levels of DMAc, fiber dust or fly, remove to fresh air. Get medical attention if cough or other symptoms develop.

SKIN CONTACT

Wash with soap and water. Get medical attention if irritation develops or persists. Use hand cream to soothe and moisten irritated skin.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician, if irritation persists or develops later.

INGESTION

Not a probable route. However, in case of gastro-intestinal distress following accidental ingestion, call a physician.

5. FIRE FIGHTING MEASURES**FLAMMABLE PROPERTIES**

Flash point:	Not applicable
Flammable limits in Air:	Not applicable
Lower Explosive limits:	Not applicable
Upper Explosive limits:	Not applicable
Auto-ignition temperature:	Not available

HAZARDOUS COMBUSTION PRODUCTS

Combustion gases are similar to those from wool - mostly carbon dioxide, water and oxides of nitrogen. However, carbon monoxide, small amounts of hydrogen cyanide, ammonia, aldehydes, aliphatic hydrocarbons and other toxic gases may be produced depending on the conditions of burning.

UNUSUAL FIRE AND EXPLOSION HAZARDS

NOMEX® brand paper and pressboard are inherently flame resistant, but can be ignited. The limiting oxygen index (LOI) of these products ranges from 27 to 63 depending on thickness, type and density. The aramid papers (Types 410, 411, 412, and 414) range from 27 to 32; the aramid pressboard (Types 992, 993, and 994) range from 29 to 39, and the mica-containing papers (Types 418 and 419) are as high as 63. All of these products must be heated to temperatures in excess of normal use conditions (greater than 240°C) for the LOI to drop below 21%.

Burning normally stops when the ignition source is removed, but dust may smolder.

Dust from NOMEX® paper and pressboard does not present an explosion hazard.

EXTINGUISHING MEDIA

Water, foam, dry chemical and CO₂ are all acceptable.

FIRE FIGHTING INSTRUCTIONS

Wear self-contained breathing apparatus.

Keep personnel removed and upwind of fire.

Wear full protective equipment (full bunker gear.)

6. ACCIDENTAL RELEASE MEASURES**SAFEGUARDS (Personnel)**

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (personnel) sections before proceeding with clean up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean up.

SPILL CLEAN-UP

Vacuum or sweep up material for salvage or disposal.

Paper and pressboard are not biodegradable and should not be flushed to surface waters or drains.

ACCIDENTAL RELEASE MEASURES

Wash, shovel or mop up and place in solid waste containers.

NOMEX® brand paper and pressboard are not biodegradable; do not flush to drains.

7. HANDLING AND STORAGE**HANDLING (Personnel)**

Use good material handling practices.

HANDLING (Physical Aspects)

Use good material handling practices.

STORAGE

NOMEX® paper and pressboard are degraded by ultraviolet light. Do not store in direct sunlight. Fluorescent lighting will cause discoloration, but will not affect mechanical properties.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION**ENGINEERING CONTROLS**

Use sufficient ventilation to keep employee exposure below recommended limits.

GENERALLY APPLICABLE CONTROL MEASURES AND PRECAUTIONS

Use only with adequate ventilation. Avoid dust generation. Do not consume food, drink or tobacco in areas where they may become contaminated with this material.

If fumes or dusts are generated, use engineering controls (where technically feasible) whenever necessary to control exposures below applicable limits. Fumes and smoke from laser cutting or machining of papers of NOMEX® should be well exhausted or removed by ventilation

PERSONAL PROTECTIVE EQUIPMENT

EYE PROTECTION: Wear safety glasses with side shields for general protection.

SKIN PROTECTION: None required. If handling paper edges continuously, wear gloves to prevent skin cutting, abrasion and irritation.

RESPIRATORY PROTECTION:

Respirator use must be in accordance with OSHA Standard 29 CFR 1910.134 (the "Respirator Standard").

Where airborne dust concentrations are expected to exceed applicable exposure limits, or where there is potential for irritation of the nasal passages by the mechanical action of dust or fly, NIOSH-approved respirators should be used.

An air-purifying respirator with a dust/mist/fume cartridge or canister may be used under circumstances meeting the Respirator Standard.

Disposable dust masks (3M model N95 8210 or equivalent) may also be used.

When NOMEX® brand paper and pressboard are used at elevated temperatures, or in a way that might create airborne DMAc or decomposition products in excess of applicable exposure limits, wear NIOSH-approved organic vapor cartridge respirators.

EXPOSURE GUIDELINES

Component	Exposure Guidelines			
	OSHA PEL	ACGIH TLV	DuPont AEL*	AIHA WEEL
Poly(isophthaloylchloride/ m-phenylenediamine) (Polymer of NOMEX®)	None established	None established	10mg/m ³ , 8 hr TWA, total dust 5mg/m ³ , 8 hr TWA, respirable dust	5mg/m ³ 8 hr TWA total dust for non-respirable fibers and non-fibrous particles
N,N-dimethylacetamide (DMAc)	10ppm, 35mg/m ³ 8hr. TWA, skin	10ppm, 36mg/m ³ 8hr. TWA, skin, A4	10ppm, 8hr. TWA, skin	None established
Mica - Quartz free (In Types 418 and 419 paper)	3 mg/m ³ 8 hr. TWA, respirable dust	3 mg/m ³ 8 hr. TWA, respirable dust	None established	None established
* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits that are lower than the AEL are in effect, such limits shall take precedence.				

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	Mild
FORM:	Solid, Sheets, Tape.
SPECIFIC GRAVITY:	NOMEX® Fiber, 1.38g/cc; papers and pressboard variable depending on grade.
VAPOR DENSITY:	Not applicable
COLOR:	Off-white, tan, gray
pH:	Not applicable
VAPOR PRESSURE:	Not applicable
BOILING POINT:	Not applicable
SOLUBILITY IN WATER:	Insoluble
MELTING POINT:	Does not melt

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY:

Stable at normal temperatures and storage conditions.

CONDITIONS TO AVOID:

Heating NOMEX® paper above about 200°C (392°F) will rapidly drive out the DMAc. DMAc vapors may present an inhalation hazard in confined spaces.

INCOMPATIBILITY WITH OTHER MATERIALS:

None reasonably foreseeable.

DECOMPOSITION:

NOMEX® paper and pressboard begin to thermally degrade rapidly above about 300°C (572°F). Decomposition can produce irritating and toxic gases.

POLYMERIZATION:

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

NOTE ON DMAc HAZARD: Keep in mind that the effects of DMAc cited in this MSDS are exposure dependent, and may not appear except at significant exposures. Because the DMAc in NOMEX® is not readily available at room temperature, typical workplace handling has only produced levels of absorbed DMAc that are well below the levels at which health effects occur

EYE EFFECTS:

NOMEX® is untested for eye irritancy. As with other particles, mechanical action of fibers in the eye may cause slight irritation.

DMAc is an eye irritant in animals and man. Eye contact may include eye irritation with discomfort, tearing, or blurring of vision.

SKIN EFFECTS:

NOMEX® is not a skin irritant, or a skin sensitizer in animals.

Skin sensitization has not been observed in human patch tests or in industrial experience. NOMEX® brand fibers have been used in direct contact with the skin in industrial gloves and protective apparel for many years.

The mechanical action of the fibers may cause slight skin irritation at clothing binding points. Repeated harsh rubbing of the skin with fibrous dust or supported fiber structures (e.g., sized, coated or impregnated papers, paper edges, etc.) may cause abrasion, with resulting irritation and rash. Symptoms disappear following cessation of skin contact.

DMAc skin absorption toxicity: LD 50 for rabbits is 2240mg/kg (moderately toxic by skin absorption).

DMAc is a skin irritant, but not a skin sensitizer in animals. In humans, skin contact can cause irritation with discomfort or rash.

Mica dust is untested for skin irritancy or for animal sensitization.

ACUTE ORAL EFFECTS:

NOMEX® has very low toxicity by ingestion.

Oral ALD >7500mg/kg in rats.

DMAc LD50 in female rats is 4930mg/kg (slightly toxic).

ACUTE INHALATION EFFECTS:

Industrial experience shows that inhalation of fibrous dust and fly may cause mechanical irritation of the mucous membranes of the nose and throat with resulting dry cough, sneezing, scratchy throat and runny nose. Symptoms cease upon cessation of exposure.

Human health effects of overexposure to DMAc by inhalation or skin absorption may initially include nonspecific discomfort such as nausea, headache, or weakness; temporary nervous headache, confusion, loss of coordination, and loss of consciousness; abnormal liver and kidney functions as detected by laboratory tests or jaundice (liver). Skin permeation occurs rapidly and can occur in amounts capable of producing the effects of systemic toxicity. There are no reports of human sensitization. Individuals with pre-existing diseases of the liver may have increased susceptibility to the toxicity of excessive exposure.

Mica dust has very low acute toxicity by inhalation; 4 hour LC50 is greater than 24 mg/liter.

SUBCHRONIC INHALATION EFFECTS:

A two-week subchronic test in which mice were exposed to DMAc via inhalation showed liver and testicular effects at high exposure concentrations (300, 500 and 700ppm.) No adverse effects were observed at 100 ppm.

CHRONIC INHALATION EFFECTS:

NOMEX® Fibers:

NOMEX® brand paper and pressboard do not break down into respirable fibrils when abraded; instead they produce non-fibrous particles. A 2.5mg sample prepared by grinding NOMEX® paper into small particles was instilled once into rat lungs. Tissue response was measured histopathologically in groups of rats at periodic sacrifices from 2 days to 2 years. No sign of adverse response to the dust from NOMEX® was seen.

No animal tests have been run to define mutagenic, developmental or reproductive hazards of NOMEX® paper.

DMAc:

Toxic effects, described in animals, from exposure by inhalation, ingestion or skin contact include retinal, liver, lung and kidney effects, reduced spermatogenesis, bone marrow effects and ataxia. Tests in animals demonstrate no carcinogenic activity. Tests in mammalian cell cultures demonstrate no mutagenic activity. In laboratory tests, application of DMAc to the skin of pregnant rats has caused fetal deaths when the doses were close to the lethal dose level for the mother. Embryonal malformations have been observed at dose levels 20% of the lethal dose and higher. However, when male and female rats were exposed to mean concentrations of DMAc at 31ppm, 101ppm, and 291ppm for 6 hours per day over several weeks, no reproductive effects were observed.

If there is significant potential for skin contact with DMAc, biological monitoring should be done to measure the level of DMAc metabolites in urine specimens collected at the end of the shift. It is DuPont practice to limit individual end-of-shift DMAc metabolite in urine levels to 40ppm or below, expressed as monomethylacetamide (MMAc) and to control average DMAc metabolite in urine levels for the job to 20ppm or below, expressed as MMAc.

Mica:

There is some evidence in animal exposure studies and human epidemiology that mica dust may cause fibrosis at repeated high exposures. Individuals with pre-existing diseases of the lungs may have increased susceptibility to the toxicity of excessive exposures.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:

NOMEX® brand paper and pressboard are essentially inert in the environment. They do not decompose in landfills and other natural environments and do not release toxic degradation materials into the ecosystem.

This material would not be toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL

These products are not hazardous waste as defined by regulations implementing the Resource Conservation and Recovery Act (RCRA). In general, waste materials of NOMEX® may be discarded in accordance with the State and Local regulations governing the disposal of other common or non-RCRA regulated waste materials

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name: None. Not regulated.

CANADA

TDG CLASS: Not regulated.

ICAO

International Civil Aviation Organization classification not required.

IMDG

International Maritime Dangerous Goods classification not required.

15. REGULATORY INFORMATION

U. S. FEDERAL REGULATIONS

OSHA:

This MSDS is provided to comply with provisions of the Hazard Communication Standard (29 CFR 1910.1200).

EPA:

NOMEX® is listed on the TSCA Inventory.

CERCLA: NOMEX® is not regulated as hazardous waste under CERCLA

SARA: TITLE III, Section 313: Not reportable.

CLEAN AIR ACT AMENDMENTS OF 1990: NOMEX® paper and pressboard and their packaging do not contain, nor are they manufactured with, any of the ozone-depleting substances listed in either Class I (chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform) or Class II (hydrochlorofluorocarbons) of the Clean Air Act Amendments of 1990.

FDA/USDA:

No NOMEX® brand paper or pressboard products are approved for use as articles or components of articles intended for repeated contact with food.

STATE REGULATIONS

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

NOMEX® paper and pressboard contain none of the substances known to the State of California to cause cancer or reproductive toxicity.

Pennsylvania and New Jersey Right-to-Know Laws:

NOMEX® paper and pressboard are considered "articles" and not subject to the provisions of the Pennsylvania and New Jersey Right-to-Know laws.

INTERNATIONAL REGULATIONS

CANADA

This material is not WHMIS controlled.

This material is not TDG regulated.

16. OTHER INFORMATION

**CAUTION: DO NOT USE IN MEDICAL APPLICATIONS INVOLVING
PERMANENT OR TEMPORARY IMPLANTATION IN THE
HUMAN BODY OR CONTACT WITH BODY FLUIDS.**

NFPA Ratings

Health 0
Flammability 1
Reactivity 0

NPCA-HMIS Ratings

Health 0* (chronic health effects)
Flammability 1
Reactivity 0

REFERENCES:

Reinhardt, C.F., M.D., *Proceedings of the National Workshop on Substitutes for Asbestos*, (1980), EPA-560/3-80-001, 443-447.

Malley, L.A., Slone, T.W., Jr., Makovec, G.T., Elliott, G.S. and Kennedy, G.L., Jr., *Fundamental and Applied Toxicology*, 28 (1995), 80-93.

Skulberg, K.R., Gylseth, B., Skang, V., Hanao, R., *Scand. J. Work Environ. Health II* (1985), 65-74.

NOTE:

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

RESPONSIBILITY FOR THIS MSDS:

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End of MSDS