



Material Safety Data Sheet
N 4000 Series Prepreg and Laminate

Section 1 : Company and Product Identification

1420 West 12th Place
 Tempe, AZ 85281

Emergency Phone Number (602) 619-5040
 Information Phone Number (480) 967-5600

This MSDS covers this product as manufactured at any Nelco/Neltec facility. Inquires about the health and safety aspects of this product may be addressed to the above location, or your local sales representative.

Trade Name: **N 4000 Series Prepreg and Laminate**

This Material Safety Data Sheet covers the following Nelco/Neltec prepreg and laminate products:

- 4105-2, 4205-2
- 4105-6, 4205-6
- 4105-7, 4205-7
- 4105-6FC, 4205-6FC
- 4105-11, 4205-11
- 4103-13, 4203-13
- 15193

Section 2 : Hazardous Ingredients

| Chemical Name | CAS # | Wt. % | OSHA PEL | ACGIH TLV | SARA 313 YES / NO |
|--|------------|-------|----------------------|----------------------|-------------------|
| Brominated Bisphenol A Epoxy Resin (polymer) | 26265-08-7 | 34-63 | NE | NE | No |
| Fibrous Glass Fabric | 65997-17-3 | 24-60 | 15 mg/M ³ | 10 mg/M ³ | No |
| Respirable Fibrous Glass | 65997-17-3 | <1 | 5 mg/M ³ | 5 mg/M ³ | No |
| N,N-Dimethylformamide | 68-12-2 | <0.1 | 10 ppm | 10 ppm | Yes |
| Acetone | 67-64-1 | Trace | 750 ppm | 250 ppm | No |
| Methyl Ethyl Ketone | 78-93-3 | Trace | 200 ppm | 200 ppm | Yes |
| Copper | 7440-50-8 | 0-85 | NE | NE | Yes |
| Inert Filler | NA | 0-25 | Nuisance Dust | Nuisance Dust | No |

NE= Not Established

Section 3 : Hazards Identification (Effects of Exposure)

Normal storage and handling of rolled prepreg is not expected to present any health hazards to those handling it. However, slitting or sheeting this product does release resin and fiberglass dust which then become airborne. In addition to the dusts released during the slitting and sheeting of this product, solvent vapors are released during the lamination process.

The following section describes the possible consequences of exposure to the dusts and solvents associated with these slitting, shearing, and laminating operations.

SIGNS AND SYMPTOMS OF EXPOSURE

Resin Dust and Fiberglass:

- | | | | |
|--|--|--------------------------------------|---|
| <input type="checkbox"/> Dizziness | <input type="checkbox"/> Coma | <input type="checkbox"/> Vomiting | <input type="checkbox"/> Rapid Breathing |
| <input type="checkbox"/> Nausea | <input checked="" type="checkbox"/> Coughing | <input type="checkbox"/> Chills | <input type="checkbox"/> Rapid Heart Rate |
| <input type="checkbox"/> Vision Impairment | <input type="checkbox"/> Headaches | <input type="checkbox"/> Fever | <input type="checkbox"/> Muscle Spasms |
| <input checked="" type="checkbox"/> Rash | <input checked="" type="checkbox"/> Itching | <input type="checkbox"/> Other _____ | |

Solvents:

- | | | | |
|---|---|--------------------------------------|---|
| <input checked="" type="checkbox"/> Dizziness | <input type="checkbox"/> Coma | <input type="checkbox"/> Vomiting | <input type="checkbox"/> Rapid Breathing |
| <input checked="" type="checkbox"/> Nausea | <input checked="" type="checkbox"/> Coughing | <input type="checkbox"/> Chills | <input type="checkbox"/> Rapid Heart Rate |
| <input type="checkbox"/> Vision Impairment | <input checked="" type="checkbox"/> Headaches | <input type="checkbox"/> Fever | <input type="checkbox"/> Muscle Spasms |
| <input type="checkbox"/> Rash | <input type="checkbox"/> Itching | <input type="checkbox"/> Other _____ | |

MEDICAL CONDITIONS AGGRAVATED BY THIS MATERIAL

Although these airborne dusts and solvents do not effect most individuals, certain individuals with skin sensitization, contact dermatitis, or asthma may experience reactions if exposed.

NOTE TO PHYSICIANS: None

Section 4: First Aid Measures

| | Eyes | Skin | Inhalation | Ingestion |
|--|--|-------------------------------------|-------------------------------------|--------------------------|
| Flush with running water for 15 minutes | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| Remove to fresh air | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Administer oxygen | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Seek immediate medical attention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Seek medical attention if symptoms persist | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Induce vomiting | | | | <input type="checkbox"/> |
| Administer carbon slurry or sodium bicarbonate | | | | <input type="checkbox"/> |
| Other First Aid Measures: | <u>If skin rash occurs, follow the 15 minute rinse with a mild soap and water wash to mechanically remove any fiberglass fibers. Dispose of any contaminated clothing.</u> | | | |

NOTES TO PHYSICIAN: None

Section 5: Fire Fighting Measures

| | | | |
|--|--|---|---|
| Flash Point | <u>NA</u> °F | Extinguishing Media: | <input type="checkbox"/> NA |
| Lower Explosion Limit % | <u>NA</u> % | <input checked="" type="checkbox"/> Foam | <input checked="" type="checkbox"/> Water <input checked="" type="checkbox"/> CO ₂ |
| Upper Explosion Limit % | <u>NA</u> % | <input checked="" type="checkbox"/> Halon | <input checked="" type="checkbox"/> Dry Chemical |
| Hazardous Products of Decomposition: | NFPA 704 Ratings: Health <u>1</u> Flammability <u>0</u> Reactivity <u>0</u> | | |
| <input checked="" type="checkbox"/> Nitrous Oxides | <input checked="" type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Vinyl Chloride | <input type="checkbox"/> Sulfurous Oxides |
| <input checked="" type="checkbox"/> Aldehydes | <input checked="" type="checkbox"/> Hydrogen Cyanide | <input checked="" type="checkbox"/> Various Acids | |
| <input checked="" type="checkbox"/> Other: <u>Hydrogen bromide is also released when the material is burned. Avoid breathing the products of decomposition. (OSHA PEL = 3 ppm)</u> | | | |

Special Fire Fighting Procedures:

Fire fighting should only be performed by professionals trained and equipped to handle hazardous materials incidents.

Other Fire/Explosion Hazard Data:

Sudden releases of hot organic vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment containing these vapors, may result in ignitions without the presence of an obvious ignition source. Therefore, published "autoignition" or "ignition" temperature values cannot always be used as safe operating temperatures in chemical processes without proper analysis of the actual process conditions. As with all products, it is the responsibility of the user to thoroughly evaluate their process and to establish and maintain safe process parameters.

Section 6: Accidental Release Measures

Spill and Leak Procedures:

Spills or leaks are not expected to occur.

Personal Precautions:

Not Applicable.

Precautions to Protect The Environment:

Not Applicable.

Methods For Collection:

Not Applicable.

Section 7: Handling and Storage

Storage and Handling:

Rolls of prepreg can be very heavy. Safe handling requires the use of automated material handling equipment.

Waste Disposal:

Always follow all local, state and federal regulations when disposing of waste materials.

Section 8: Exposure Controls / Personal Protection

Although the following control measures will control atmospheric contamination in most manufacturing processes, it is your responsibility as the user of this product to determine the atmospheric concentrations of the various contaminants at your worksite and take whatever additional precautions may be necessary to keep the concentrations below the established exposure limits.

Ventilation:

- Area, general - This is important during the sheeting and lamination processes.
- Local - Use engineering controls such as enclosures, exhaust ventilation, and dust collection systems wherever possible to keep airborne concentrations of vapors, dust fibers below established exposure limits. Avoid the use of air jets to blow off equipment. This is particularly important during the slitting, sheeting, and lamination operations.

Personal Protective Equipment Required:

- Gloves and or sleeves
Cured resins contain trace amounts of solvents which can cause skin sensitization. Gloves and/or sleeves may be required by workers with sensitive skin or contact dermatitis. It is recommended that any skin area that may come in regular contact with this material be protected with gloves, sleeves or other appropriate barrier material at all times.
- Apron
Although usually not required, it should be noted that fibers or dust from the material may irritate the skin due to mechanical action of fibers. Individuals sensitive to these fibers should wear an apron.

Respiratory Protection

Respiratory protection may be required to prevent overexposure to both the dusts and the solvent vapors. Refer to the chemical ingredients section and follow appropriate industrial hygiene practices to determine if the levels of contaminants are high enough to require respiratory protection.

 Eye Protection

Although not a corrosive material, glass fibers and trace amounts of severe eye irritants are present in this prepreg material. Depending on the level of dust present while cutting the material, safety glasses or goggles should be worn at all times.

Section 9: Physical and Chemical Properties

| | | | |
|-------------------------|---------------------|-----------------------------------|--------------------|
| Color | <u>White</u> | Odor | <u>None</u> |
| Melting Point | <u>120 - 260 °F</u> | Percent Volatile (prepreg) | <u>< 0.25 %</u> |
| Flash Point | <u>NA °F</u> | (laminates) | <u>< 0.25 %</u> |
| Boiling Point | <u>NA °F</u> | Vapor Density | <u>NA</u> |
| Specific Gravity | <u>>1.5</u> | Vapor Pressure | <u>NA</u> mmHg |

Other Physical or Chemical Properties: None

Section 10: Stability and Reactivity

Reactivity: Stable Reactive

Physical Hazards: Pyrophoric Explosive Compressed Gas
 Oxidizer Water Reactive Other: _____

Avoid contact with:

Strong Acids Strong Bases Oxidizers Flammable Liquids
 Water Most Metals Oils and Greases
 Other: None

Hazardous Polymerization:

Will Occur Will not occur

Hazardous polymerization of B-staged prepreg will not occur under normal storage and handling conditions. Additionally, B-staged prepreg processed by the conventional methods used in the circuit board industry will not undergo hazardous polymerization. However, like all resin material, if processed under extreme conditions, (extreme heat rise or cure temperature) resin materials such as this product are capable of undergoing hazardous polymerization which results in exothermic decomposition. The products of this decomposition are listed in the fire and explosion data section.

As with all products, it is the responsibility of the user to thoroughly evaluate their process and to establish and maintain safe process parameters. Refer to the following section as an initial guide.

Process Conditions to Avoid:

- 1.) Lamination thicknesses of over 0.75 inches without proper heat sink such as caul plates. Typical industry standards seldom approach 0.25 inches in thickness.
- 2.) Extreme heat rise conditions.
- 3.) Cure temperatures in excess of 10°F over the recommended lamination temperature.

Section 11: Toxicological Information

PRIMARY ROUTES OF ENTRY

| | Contribution to Overall Exposure | | |
|-----------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | Significant | Minor | Not Likely |
| Inhalation | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Skin Absorption | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Eye Contact | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Ingestion | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Other: | _____ | | |

EFFECTS ON TARGET ORGANS

| | <u>ACUTE</u> | | <u>CHRONIC</u> |
|-------------------------|-------------------------------------|--------------------------|-------------------------------------|
| | Irritant | Corrosive | Toxin |
| Eyes | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Skin | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Upper Respiratory Tract | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Lower Respiratory Tract | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Central Nervous System | | | <input checked="" type="checkbox"/> |
| Liver | | | <input type="checkbox"/> |
| Kidney | | | <input type="checkbox"/> |
| Heart | | | <input type="checkbox"/> |
| Gastrointestinal | | | <input type="checkbox"/> |
| Other Organ(s) | _____ | | |

CARCINOGENICITY AND REPRODUCTIVITY STUDIES

| | <u>Human</u> | | <u>Animal</u> | | Not Listed |
|--------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|
| | Known | Suspect | Known | Suspect | |
| Carcinogen (OSHA) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Carcinogen (NTP) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Carcinogen (IARC) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Mutagen | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Teratogen | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Reproductive Toxin | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

As the chart above indicates, this product is not listed by any of the cancer research agencies as a cancer causing agent. This product may contain trace amounts of solvents used in the manufacturing of the base resins. These solvents have various known health effects including cancer. General information about these solvents is listed below. Additional information can be obtained from conventional chemical data resources. Exposure to these solvents at or above any published threshold limits is not expected.

Fibrous Glass: This product contains fibrous glass. Although early studies showed possible links between fibrous glass and cancer, current research indicates no links between fibrous glass and human cancer. Glass wool, which differs from fibrous glass in its morphology, continues to be evaluated as a possible human carcinogen (Group 2B) by the IARC.

Section 12: Ecological Information

This product does not contain any ingredients expected to exhibit any ecologic effects.

Section 13: Disposal Considerations

This product is not considered a RCRA hazardous waste. Dispose in accordance with local regulations.

Section 14: Transport Information

DOT Road Shipment Information:

This product is considered non-hazardous by the U.S. Department of Transportation (49 CFR 172.101).

Ocean Shipment:

This product is considered non-hazardous by the IMDG.

Air Shipment Information:

This product is considered non-hazardous by IATA.

Section 15: Regulatory Information

SARA 313 Information

Any ingredient marked "Yes" in the SARA 313 column of the Hazardous Ingredients section of this MSDS is a toxic chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Toxic Substances Control Act (TSCA)

All ingredients in this product are included on, or exempted from, listing on this list.

Metals Content

Trace amounts of various metals are found in many of the raw materials (mostly glass and copper) from which pre-preg and laminate are made. In an attempt to assist the users of this product, analysis has been performed on a limited number of pre-preg and laminate samples. Metals concentration is a function of the product's construction and will vary between samples. Below are the results of this limited testing which, in some cases, represents averages of multiple sample analysis:

| | Pre-preg (mg/kg) | Laminate (mg/kg) |
|------------------------------|---------------------|---------------------|
| ♦ Antimony..... | <60..... | <60..... |
| ♦ Arsenic..... | 16..... | <100..... |
| ♦ Beryllium..... | <0.02..... | <0.02..... |
| ♦ Cadmium..... | <0.02..... | <0.02..... |
| ♦ Chromium (hexavalent)..... | <0.5..... | <0.5..... |
| ♦ Chromium (total)..... | <20..... | <35..... |
| ♦ Cyanide..... | <1.5..... | <1.5..... |
| ♦ Lead..... | <0.3..... | <0.3..... |
| ♦ Mercury..... | <0.5..... | <0.5..... |
| ♦ Nickel..... | <5..... | <5..... |
| ♦ Tin..... | <0.2..... | <0.2..... |

PBB, TBBA, PBDE and Other Chemicals of Special Interest:

Based on information from the resin, glass and copper suppliers providing the raw materials for this product, it is believed that this product does not contain any of the following ingredients:

- | | |
|------------------------------------|--|
| ♦ Beryllium or beryllium compounds | ♦ Poly-brominated biphenyls (PBB) |
| ♦ Chlorinated Paraffins | ♦ Poly-brominated diphenyl ethers |
| ♦ Organophosphorus compounds | ♦ Poly-chlorinated biphenyls (PCBs) |
| ♦ Ozone depleting substances | ♦ Selenium and selenium compounds |
| ♦ Phthalates | ♦ Tetrabromobisphenol A (TBBA) monomer |

The information listed above does not include all state, federal, and international regulations. The regulatory information supplied may change from time to time. It is the user's responsibility to keep advised of all applicable regulatory requirements.

Section 16: Other Information

The information and recommendations contained in this Material Safety Data Sheet are supplied pursuant to the Occupational Safety and Health Administration's Hazard Communication Standard as promulgated under 29 CFR

1910.1200 and the United States Environmental Protection Agency's Supplier Notification Rule as promulgated under 40 CFR 372.45.

This document is intended only as a guide to the appropriate precautionary handling of the material by a person trained in the proper procedures of safe chemical handling. Nelco provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy.

No representations or warranties, either express or implied, of merchantability, fitness for a particular purpose, or of any nature are made with respect to the product(s) or information contained in this Material Safety Data Sheet.

Chemical additions, processing or otherwise altering this material may make the safety information presented above incomplete, inaccurate or otherwise inappropriate.

The user is responsible for determining the precautions and dangers of this chemical for his or her particular application. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist. Final determination of suitability of the chemical is the sole responsibility of the user.

Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its use and disposal of this product comply with federal, state or provincial, and local laws. The buyer or user assumes all risks associated with the use, misuse or disposal of this product.

As new documented safety information becomes available, Nelco/Neltec will revise this Material Safety Data Sheet and forward an updated copy to all current customers.

The information listed above does not include all state, federal, and international regulations. The regulatory information supplied may change from time to time. It is the user's responsibility to keep advised of all applicable regulatory requirements.

Last Updated 11-21-02

Prepared by Ron Fleming