SECTION 1 - CHEMICAL PRODUCT AND COMPANY INFORMATION

PRODUCT NAME: GRADE 594 SOLVENT
PRODUCT USE: Flexographic Ink Solvent
Not recommended for: Consumer Use

Manufacturer/Supplier:
PANNIER CORPORATION
207 SANDUSKY STREET
PITTSBURGH, PA 15212-5823 U.S.A.
412-323-4900
SALES@PANNIER.COM

24 Hr Emergency Telephone Number: INFOTRAC 800-535-5053

SECTION 2 - HAZARDS IDENTIFICATION

Classification of the chemical
Clear to slightly yellow liquid. Peppermint odor.
Most important hazards: This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015).
Hazard classification:
Flammable Liquids - Category 2
Acute toxicity, oral - Category 4
Acute toxicity, dermal - Category 3
Skin Corrosion/Irritation - Category 2
Eye Damage/Irritation - Category 1

Label elements
Hazard pictogram(s)

Signal Word
DANGER!

Hazard statement(s)
Flammable liquid and vapor
Toxic in contact with skin.
Harmful if swallowed.
Causes skin irritation.
Causes serious eye damage.

Precautionary statement(s)
Keep away from heat, open flames and hot surfaces. - No smoking.
Keep container tightly closed.
Ground/Bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wash hands thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/clothing and eye/face protection.
If on skin: Wash with plenty of soap and water.
Call a POISON CENTER or doctor/physician if you feel unwell.
Take off immediately all contaminated clothing and wash it before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Immediately call a POISON CENTRE or doctor/physician.
In case of fire: Use water fog, dry chemical, CO2 or ‘alcohol’ foam for extinction.

Store locked up. Store in a well-ventilated place. Keep cool.

Dispose of contents/container in accordance with local regulation.

Precautionary statement(s)

**Other hazards**

Other hazards May be sensitive to static discharge. Take measures to prevent the buildup of electrostatic charge.

Other hazards which do not result in classification:

- Burning produces obnoxious and toxic fumes. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. May be an aspiration hazard. Aspiration into the lungs during swallowing or subsequent vomiting may cause chemical pneumonitis, which can be fatal.

**SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS**

<table>
<thead>
<tr>
<th>Pure substance</th>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclohexanone</td>
<td>Cyclohexyl ketone</td>
<td>108-94-1</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION 4 - FIRST AID MEASURES**

**Description of first aid measures**

**Ingestion:** Rinse mouth. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention. If vomiting occurs spontaneously, keep victim’s head lowered (forward) to reduce the risk of aspiration.

**Inhalation:** IF INHALED: Remove person to fresh air and keep comfortable for breathing. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen by qualified medical personnel only. Call a POISON CENTRE or doctor/physician if you feel unwell.

**Skin contact:** Immediately flush with plenty of water, while removing contaminated clothing. Immediately call a POISON CENTER or doctor/physician. Wash contaminated clothing before reuse.

**Eye contact:** For eye contact, flush with running water for at least 15 minutes. If eye irritation persists, get medical advice/attention.

**Most important symptoms and effects, both acute and delayed** May cause respiratory irritation. May cause coughing and breathing difficulties. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Aspiration hazard. Aspiration into the lungs during swallowing or subsequent vomiting may cause chemical pneumonitis, which can be fatal. May cause eye irritation. Symptoms may include redness, pain, tearing and conjunctivitis. Prolonged exposure can cause central nervous system effects. May cause skin irritation. Symptoms may include redness, itching and swelling.

**Indication of any immediate medical attention and special treatment needed** Treat symptomatically. Aspiration hazard.

**SECTION 5 - FIRE FIGHTING MEASURES**

**Extinguishing media**

**Suitable extinguishing media** Carbon dioxide (CO2); Dry chemical; Alcohol-resistant foam; water fog.

**Unsuitable extinguishing media** Do not use a solid water stream as it may scatter and spread fire.

**Special hazards arising from the substance or mixture/Conditions of flammability** Highly flammable liquid and vapor. Vapors may ignite explosively. Vapors are heavier than air and may spread along floors. Static discharge, impact, friction, and heat may ignite exposed chemical material. Empty containers may contain hazardous residues. Flammability classification (OSHA 29 CFR 1910.106) Flammable Liquid Category 3

**Hazardous combustion products** Carbon dioxide and carbon monoxide. Incomplete combustion may emit component hydrocarbons.

**Special protective equipment and precautions for firefighters**

**Protective equipment for fire-fighters** Firefighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode.

**Special fire-fighting procedures** Do not breathe fumes or vapors. Move containers from fire area if safe to do so. Cool closed containers exposed to fire with water spray. Do not allow run-off from firefighting to enter drains or water courses. Dike for water control.

**SECTION 6 - ACCIDENTAL RELEASE MEASURES**

**Personal precautions, protective equipment and emergency procedures** All persons dealing with the clean-up should wear the appropriate chemically protective equipment. Keep people away from and upwind of spill/leak. Restrict access to area until completion of clean-up. Refer to protective measures listed in sections 7 and 8.

**Environmental precautions** Do not allow material to contaminate ground water system. If necessary, dike well
Methods and material for containment and cleaning up Ventilate the area. Remove all sources of ignition. Prevent further leakage or spillage if safe to do so. Use only non-sparking tools and equipment in the clean-up process. Avoid breathing mist or vapours. Contain and absorb spilled liquid with non-combustible, inert absorbent material (e.g. sand), then place absorbent material into a container for later disposal (see Section 13). Contact the proper local authorities. Refer to Section 13 for disposal of contaminated material.

Special spill response procedures Contact appropriate local and provincial environmental authorities for assistance and/or reporting requirements. EPA/CERCLA Reportable quantity (RQ): Cyclohexanone (5000 lbs / 2270 kg)

SECTION 7 - HANDLING AND STORAGE

Precautions for safe handling Wear protective gloves/clothing and eye/face protection. Use only in well-ventilated areas. Avoid breathing vapour or mist. Avoid contact with skin, eyes and clothing. Keep container tightly closed. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Keep away from flames and hot surfaces. – No smoking. Use only non-sparking tools. Take precautionary measures against static discharges. Ground all equipment during handling.

Conditions for safe storage: Keep container tightly closed. Store in cool/well-ventilated place. Store locked up. Keep cool. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks. No smoking. Empty containers may contain hazardous residues.

Incompatible materials: Strong oxidizers (e.g. Chlorine, Peroxides, etc.); Nitric acid

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TWA</td>
<td>STEL</td>
</tr>
<tr>
<td>Cyclohexanone</td>
<td>20 ppm</td>
<td>50 ppm</td>
</tr>
</tbody>
</table>

Exposure controls

Ventilation and engineering measures Use only in well-ventilated areas. Apply technical measures to comply with the occupational exposure limits. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. Use explosion-proof equipment. In case of insufficient ventilation wear suitable respiratory equipment.

Respiratory protection If airbourne concentrations are above the permissible exposure limit or are not known, use NIOSH-approved respirators. Respirators should be selected based on the form and concentration of contaminants in air, and in accordance with OSHA (29 CFR 1910.134) or CSA Z94.4-02. Advice should be sought from respiratory protection specialists.

Skin protection Wear protective gloves/clothing. Where extensive exposure to product is possible, use resistant coveralls, apron and boots to prevent contact. The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Eye / face protection Wear eye/face protection. Wear as appropriate: Tightly fitting safety goggles

Other protective equipment Ensure that eyewash stations and safety showers are close to the workstation location. Other equipment may be required depending on workplace standards.

General hygiene considerations Do not breathe mist or vapors. Avoid contact with skin, eyes and clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Remove and wash contaminated clothing before re-use. Do not take contaminated clothing home. Handle in accordance with good industrial hygiene and safety practice.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Odour: Peppermint odor.
Odour threshold: ~3ppm - varies widely
pH: None.
Melting/Freezing point: -26°C (-15°F)
Initial boiling point and boiling range: 156°C (313°F)
Flash point: 47°C (116°F)
Flashpoint (Method): Cleveland closed cup
Evaporation rate (BuAe = 1) faster than butyl acetate
Flammability (solid, gas): Not applicable.
Lower flammable limit (% by vol.): 1.1%
Upper flammable limit (% by vol.): 9.4%
Oxidizing properties: None known.
Explosive properties: Not explosive
GRADE 594

Vapour pressure: 4mmHg / 0.53kPa (20°C / 68°F)
Vapour density: 3.4
Relative density / Specific gravity: 0.948
Solubility in water: Soluble 23 grams per litre (20°C / 68°F)
Other solubility(ies): Soluble in most organic solvents.
Partition coefficient: n-octanol/water or Coefficient of water/oil distribution

Auto-ignition temperature: 420°C / 788°F
Decomposition temperature: No information available.
Viscosity: 2.2centipoise (25°C / 77°F)
Volatile (% by weight): No information available.
Volatile organic Compounds (VOC's) No information available.
Absolute pressure of container Not applicable.
Flame projection length: Not applicable.
Conversion Factor: 1ppm = 4mg/m3
Molecular Weight: 98grams per mole

SECTION 10 - STABILITY AND REACTIVITY
Reactivity: Not normally reactive.
Chemical stability: Stable under normal conditions. May turn yellow on prolonged exposure to air.
Possibility of hazardous reactions: Hazardous polymerization does not occur.
Conditions to avoid: Open flames, sparks, high heat, direct sunlight, and close proximity to incompatible substances. Do not use in areas without adequate ventilation.
Incompatible materials: Strong oxidizers (e.g. Chlorine, Peroxides, etc.); Nitric acid
Hazardous decomposition products: None known, refer to hazardous combustion products in Section 5.

SECTION 11 - TOXICOLOGICAL INFORMATION
Information on likely routes of exposure:
Routes of entry inhalation: YES
Routes of entry skin & eye: YES
Routes of entry Ingestion: YES
Routes of exposure skin absorption: YES
Potential Health Effects:
Signs and symptoms of short-term (acute) exposure
Sign and symptoms Inhalation May cause respiratory tract irritation. Coughing, difficulty breathing, and tightness in chest. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.
Sign and symptoms Ingestion Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Aspiration hazard. Aspiration into the lungs during swallowing or subsequent vomiting may cause chemical pneumonitis, which can be fatal.
Sign and symptoms skin: Causes skin irritation. Symptoms may include redness, itching and swelling.
Sign and symptoms eyes: Causes serious eye damage. Symptoms may include redness, pain, tearing and conjunctivitis.
Potential Chronic Health Effects: Frequent or prolonged contact may dry the skin, leading to discomfort and dermatitis.
Mutagenicity: Not expected to be mutagenic in humans.
Carcinogenicity: No components are listed as carcinogens by ACGIH, IARC, OSHA or NTP.
Reproductive effects & Teratogenicity: Not expected to cause reproductive effects.
Sensitization to material: Not expected to be a skin or respiratory sensitizer.
Specific target organ effects: According to the classification criteria of U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015), this product is not expected to cause target organ toxicity through single or repeated exposures.
Medical conditions aggravated by overexposure: Pre-existing skin, eye and respiratory disorders.
Synergistic materials: No information available.
Toxicological data: See below for toxicological data on the substance.
Acute toxicity, dermal - Category 3
Acute toxicity, oral - Category 4
SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity: Do not allow material to contaminate ground water system. See the following tables for the substance's ecotoxicity data.

Ecotoxicity data:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No</th>
<th>Toxicity to Fish</th>
<th>Toxicity to Daphnia</th>
<th>Toxicity to Algae</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LC50 / 96h</td>
<td>NOEC / 21 day</td>
<td>EC50 / 48h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOEC / 21 day</td>
<td></td>
<td>NOEC / 96h or 72h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M Factor</td>
<td></td>
<td>M Factor</td>
</tr>
<tr>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>732mg/L (Fathead minnow)</td>
<td>N/Av</td>
<td>N/Av</td>
</tr>
<tr>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>N/Av</td>
<td>N/Av</td>
<td>N/Av</td>
</tr>
</tbody>
</table>

Persistence and degradability: Readily biodegradable
Bioaccumulation potential: No information available.

Components

<table>
<thead>
<tr>
<th>Partition coefficient n-octanol/aer (log ow)</th>
<th>Bioconcentration factor (BCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.86 at 25 °C</td>
<td>will not bioconcentrate</td>
</tr>
</tbody>
</table>

Mobility in soil: The product itself has not been tested.

Other Adverse Environmental Effects: None known.

SECTION 13 - DISPOSAL CONSIDERATIONS

Handling for Disposal: Handle in accordance with good industrial hygiene and safety practice. Refer to protective measures listed in sections 7 and 8.

Methods of Disposal: Dispose in accordance with all applicable federal, state, provincial and local regulations.

RCRA: If this product, as supplied, becomes a waste in the United States, it may meet the criteria of a hazardous waste as defined under RCRA, Title 40 CFR 261. It is the responsibility of the waste generator to determine the proper waste identification and disposal method. For disposal of unused or waste material, check with local, state and federal environmental agencies.

SECTION 14 - TRANSPORT INFORMATION

Regulatory Information

<table>
<thead>
<tr>
<th>Regulatory Information</th>
<th>UN Number</th>
<th>UN proper shipping name</th>
<th>Transport hazard class(es)</th>
<th>Packing Group</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>49CFR/DOT</td>
<td>UN1915</td>
<td>CYCLOHEXANONE</td>
<td>3</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>49CFR/DOT Additional information</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDG</td>
<td>UN1915</td>
<td>CYCLOHEXANONE</td>
<td>3</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>TDG Additional information</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMDG</td>
<td>UN1915</td>
<td>CYCLOHEXANONE</td>
<td>3</td>
<td>III</td>
<td></td>
</tr>
<tr>
<td>IMDG Additional information</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Packing Code: P001, LP01
Packing Special Provisions:
- IBC Code: IBC03
- IBC Special Provision: -
- IMO Tank Instructions: T1
- UN Tank Instructions: T2
- Tank Special Provisions: TP1

ICAO/IATA
ICAO/IATA Additional information

Refer to ICAO/IATA Packing Instruction

Special precautions for user: Appropriate advice on safety must accompany the package. Keep away from heat, sparks and open flame.
- No smoking.

Environmental hazards: See ECOLOGICAL INFORMATION, Section 12.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code. This information is not available.

SECTION 15 - REGULATORY INFORMATION

US Federal Information:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS #</th>
<th>TSCA Inventory</th>
<th>CERCLA Reportable Quantity(RQ) (40 CFR 117.302):</th>
<th>SARA TITLE III: Sec. 302, Extremely Hazardous Substance, 40 CFR 355:</th>
<th>SARA TITLE III: Sec. 313, 40 CFR 372, Specific Toxic Chemical</th>
<th>Toxic Chemical de minimus Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>Yes</td>
<td>5000 lb/2270 kg</td>
<td>N/Av</td>
<td>No</td>
<td>N/Ap</td>
</tr>
</tbody>
</table>

SARA TITLE III: Sec. 311 and 312, SDS Requirements, 40 CFR 370 Hazard Classes: Fire Hazard; Immediate (Acute) health hazard Under SARA Sections 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are 500 pounds for the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

US State Right to Know Laws: The following chemicals are specifically listed by individual States:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS #</th>
<th>California Proposition 65</th>
<th>State &quot;Right to Know&quot; Lists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>N/Ap</td>
<td>CA MA MN NJ PA RI</td>
</tr>
</tbody>
</table>

Canadian Information:
Canadian Environmental Protection Act (CEPA): All ingredients are present on the DSL.
WHMIS information: Refer to Section 2 for a WHMIS Classification for this product.

International Information:
Components listed below are present on the following International Inventory list:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS #</th>
<th>European EINECs</th>
<th>Australia AICS</th>
<th>Philippines PICCS</th>
<th>Japan ENCS</th>
<th>Korea KECI/KECL</th>
<th>China IECSC</th>
<th>NewZealand IOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclohexanone</td>
<td>108-94-1</td>
<td>203-631-1</td>
<td>Present</td>
<td>Present</td>
<td>(3)-2376</td>
<td>KE-09188</td>
<td>Present</td>
<td>HSR001112</td>
</tr>
</tbody>
</table>

SECTION 16 - OTHER INFORMATION

ACGIH: American Conference of Governmental Industrial Hygienists
AICS: Australian Inventory of Chemical Substances
ATE: Acute Toxicity Estimate
CA: California
CAS: Chemical Abstract Services
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR: Code of Federal Regulations
CSA: Canadian Standards Association
DOT: Department of Transportation
ECHM: European Chemicals Agency
ECOTOX: U.S. EPA Ecotoxicology Database
EINECS: European Inventory of Existing Commercial Chemical Substances
ENCS: Existing and New Chemical Substances
EPA: Environmental Protection Agency
HSDB: Hazardous Substances Data Bank
IARC: International Agency for Research on Cancer
IBC: Intermediate Bulk Container
IECSC: Inventory of Existing Chemical Substances
IMDG: International Maritime Dangerous Goods
IOC: Inventory of Chemicals
IUCLID: International Uniform Chemical Information Database
KECI: Korean Existing Chemicals Inventory
KECL: Korean Existing Chemicals List
LC: Lethal Concentration
LD: Lethal Dose
MA: Massachusetts
MN: Minnesota
N/Ap: Not Applicable
N/Av: Not Available
NIOSH: National Institute of Occupational Safety and Health
NJ: New Jersey
NOEC: No observable effect concentration
NTP: National Toxicology Program
OECD: Organisation for Economic Co-operation and Development
OSHA: Occupational Safety and Health Administration
PA: Pennsylvania
PEL: Permissible exposure limit
PICCS: Philippine Inventory of Chemicals and Chemical Substances
RCRA: Resource Conservation and Recovery Act
RI: Rhode Island
RTECS: Registry of Toxic Effects of Chemical Substances
SARA: Superfund Amendments and Reauthorization Act
SDS: Safety Data Sheet / Material Safety Data Sheet
STEL: Short Term Exposure Limit
TDG: Canadian Transportation of Dangerous Goods Act & Regulations
TLV: Threshold Limit Values
TSCA: Toxic Substance Control Act
TWA: Time Weighted Average
WHMIS: Workplace Hazardous Materials Identification System
1. ACGIH, Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices for 2014.
3. Canadian Centre for Occupational Health and Safety, CCInfoWeb databases, 2015 (Chempendium, HSDB and RTECs).
4. Material Safety Data Sheets from manufacturer.
5. US EPA Title III List of Lists
6. California Proposition 65 List

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