SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Diffusion Technology Boron Spin-On Dopant B-150, B-100,B75X,B-49

MSDS Number : 000000011664

Product Use Description : Doping material used for integrated circuits.

Manufacturer or supplier's details : Honeywell International Inc.
115 Tabor Road
Morris Plains, NJ 07950-2546

For more information call : 1-509-252-2200
1-480-293-9800
(Monday-Friday, 9:00am-5:00pm)

In case of emergency call : Medical: 1-800-498-5701 or +1-303-389-1414
Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887
(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form : liquid, clear
Color : yellowish to brownish, clear
Odor : sweet pungent

Classification of the substance or mixture

Classification of the substance or mixture : Flammable liquids, Category 2
Acute toxicity, Category 4, Oral
Skin corrosion, Category 1B
Serious eye damage, Category 1
Reproductive toxicity, Category 2
Specific target organ toxicity - single exposure, Category 3,
Central nervous system
Specific target organ toxicity - repeated exposure, Category 2,
Central nervous system, Kidney, Liver
Aspiration hazard, Category 1

GHS Label elements, including precautionary statements

Symbol(s):

Signal word: Danger

Hazard statements: Highly flammable liquid and vapour.
Harmful if swallowed.
May be fatal if swallowed and enters airways.
Causes severe skin burns and eye damage.
May cause drowsiness and dizziness.
Suspected of damaging fertility or the unborn child.
May cause damage to organs through prolonged or repeated exposure.

Precautionary statements: Prevention:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/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.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wash skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/eye protection/face protection.

Response:
IF SWALLOWED: Immediately call a POISON CENTER or...
doctor/physician.

IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower.

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

IF exposed or concerned: Get medical advice/attention.

Rinse mouth.

Do NOT induce vomiting.

If skin irritation occurs: Get medical advice/attention.

Take off contaminated clothing and wash before reuse.

In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Storage:

Store in a well-ventilated place. Keep container tightly closed.

Store in a well-ventilated place. Keep cool.

Store locked up.

Disposal:

Dispose of contents/container to an approved waste disposal plant.

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>75.00 - 91.00 %</td>
</tr>
<tr>
<td>Borazole polymer</td>
<td>-</td>
<td>4.00 - 14.00 %</td>
</tr>
<tr>
<td>Cyclohexylamine</td>
<td>108-91-8</td>
<td>6.00 - 11.00 %</td>
</tr>
</tbody>
</table>
SECTION 4. FIRST AID MEASURES

Inhalation : Call a physician immediately. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present.

Skin contact : Wash off immediately with plenty of water for at least 15 minutes. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Call a physician.

Eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician.

Ingestion : Do not induce vomiting without medical advice. If a person vomits when lying on his back, place him in the recovery position. Call a physician immediately. Never give anything by mouth to an unconscious person.

Notes to physician

Treatment : Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media : Water may be ineffective.
Do not use a solid water stream as it may scatter and spread fire.

Specific hazards during firefighting : Flammable.
Vapours may form explosive mixtures with air.
Vapours are heavier than air and may spread along floors.
Vapors may travel to areas away from work site before igniting/flashign back to vapor source.
Cool closed containers exposed to fire with water spray.
Do not allow run-off from fire fighting to enter drains or water courses. 
In case of fire hazardous decomposition products may be produced such as: 
Carbon monoxide 
Carbon dioxide (CO2) 
Boron oxides 
Silicon oxides 

Special protective equipment for firefighters: 
- In the event of fire and/or explosion do not breathe fumes. 
- Wear self-contained breathing apparatus and protective suit. 
- No unprotected exposed skin areas.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions: 
- Immediately evacuate personnel to safe areas. 
- Keep people away from and upwind of spill/leak. 
- Wear personal protective equipment. Unprotected persons must be kept away. 
- Ensure adequate ventilation. 
- Remove all sources of ignition. 
- Vapors may travel to areas away from work site before igniting/flashing back to vapor source. 
- Do not swallow. 
- Do not breathe vapours or spray mist. 
- Avoid contact with skin, eyes and clothing.

Environmental precautions: 
- Prevent further leakage or spillage if safe to do so. 
- Discharge into the environment must be avoided. 
- Do not flush into surface water or sanitary sewer system. 
- Prevent product from entering drains. 
- Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

Methods for cleaning up: 
- Ventilate the area. 
- No sparking tools should be used. 
- Use explosion-proof equipment. 
- Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).
SECTION 7. HANDLING AND STORAGE

Handling

Handling:
- Handle with care.
- Wear personal protective equipment.
- Use only in well-ventilated areas.
- Keep container tightly closed.
- Containers which are opened must be carefully resealed and kept upright to prevent leakage.
- Keep away from fire, sparks and heated surfaces.
- Take precautionary measures against static discharges.
- Ensure all equipment is electrically grounded before beginning transfer operations.
- No sparking tools should be used.
- Use explosion-proof equipment.
- Do not smoke.
- Do not swallow.
- Do not breathe vapours or spray mist.
- Avoid contact with skin, eyes and clothing.

Advice on protection against fire and explosion:
- Vapours may form explosive mixtures with air.
- Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits.
- Vapours are heavier than air and may spread along floors.
- Vapors may travel to areas away from work site before igniting/flash back to vapor source.
- Container hazardous when empty.
- Keep product and empty container away from heat and sources of ignition.
- Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
- Take measures to prevent the build up of electrostatic charge.
- To avoid ignition of vapours by static electricity discharge, all metal parts of the equipment must be grounded.
- Electrical equipment should be protected to the appropriate standard.
- No sparking tools should be used.
- Use explosion-proof equipment.
- No smoking.
Storage

Requirements for storage areas and containers:
- Storage rooms must be properly ventilated.
- Keep containers tightly closed in a dry, cool and well-ventilated place.
- Containers which are opened must be carefully resealed and kept upright to prevent leakage.
- Keep away from heat and sources of ignition.
- Keep away from direct sunlight.
- Keep in an area equipped with solvent resistant flooring.
- Store in area designed for storage of flammable liquids.
- Protect from physical damage.
- Store away from incompatible substances.

SECTION 8. EXPOSURE CONTROLS/PERSOAL PROTECTION

Protective measures:
- Ensure that eyewash stations and safety showers are close to the workstation location.
- Do not swallow.
- Do not breathe vapours or spray mist.
- Avoid contact with skin, eyes and clothing.

Engineering measures:
- Use with local exhaust ventilation.
- Prevent vapour buildup by providing adequate ventilation during and after use.

Eye protection:
- Do not wear contact lenses.
- Wear as appropriate:
  - Safety glasses with side-shields
  - Goggles or face shield, giving complete protection to eyes

Hand protection:
- Solvent-resistant gloves
- Gloves must be inspected prior to use.
- Replace when worn.

Skin and body protection:
- Wear as appropriate:
  - Solvent-resistant apron and boots
  - Flame retardant antistatic protective clothing.
  - Protective suit

Respiratory protection:
- When workers are facing concentrations above the exposure
limit they must use appropriate certified respirators.
For rescue and maintenance work in storage tanks use self-contained breathing apparatus.
Use NIOSH approved respiratory protection.

Hygiene measures:
Handle in accordance with good industrial hygiene and safety practice.
When using, do not eat, drink or smoke.
Wash hands before breaks and immediately after handling the product.
Keep working clothes separately.
Remove and wash contaminated clothing before re-use.
Do not swallow.
Do not breathe vapours or spray mist.
Avoid contact with skin, eyes and clothing.

**Exposure Guidelines**

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Update</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>TWA : time weighted average</td>
<td>(20 ppm)</td>
<td>2008</td>
<td>ACGIH: US. ACGIH Threshold Limit Values</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>REL : Recommended exposure limit (REL):</td>
<td>375 mg/m³ (100 ppm)</td>
<td>2005</td>
<td>NIOSH/GUIDE: US. NIOSH: Pocket Guide to Chemical Hazards</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>STEL : Short term exposure limit</td>
<td>560 mg/m³ (150 ppm)</td>
<td>2005</td>
<td>NIOSH/GUIDE: US. NIOSH: Pocket Guide to Chemical Hazards</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>STEL : Short term exposure limit</td>
<td>560 mg/m³ (150 ppm)</td>
<td>1989</td>
<td>Z1A: US. OSHA Table Z-1-A (29 CFR 1910.1000)</td>
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</table>
### SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Property Description</th>
<th>Value</th>
<th>Year</th>
<th>Source/Reference</th>
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<tbody>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>TWA: time weighted average</td>
<td>375 mg/m³ (100 ppm)</td>
<td>1989</td>
<td>Z1A: US. OSHA Table Z-1-A (29 CFR 1910.1000)</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>TWA: time weighted average</td>
<td>(200 ppm)</td>
<td>02/2006</td>
<td>OSHA/Z2: US. OSHA Table Z-2 (29 CFR 1910.1000)</td>
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<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>MAX. CONC: Maximum concentration:</td>
<td>(500 ppm)</td>
<td>02/2006</td>
<td>OSHA/Z2: US. OSHA Table Z-2 (29 CFR 1910.1000)</td>
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<td>Toluene</td>
<td>108-88-3</td>
<td>Ceiling Limit Value:</td>
<td>(300 ppm)</td>
<td>02/2006</td>
<td>OSHA/Z2: US. OSHA Table Z-2 (29 CFR 1910.1000)</td>
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<tr>
<td>Cyclohexylamine</td>
<td>108-91-8</td>
<td>TWA: time weighted average</td>
<td>(10 ppm)</td>
<td>2008</td>
<td>ACGIH: US. ACGIH Threshold Limit Values</td>
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<td>Cyclohexylamine</td>
<td>108-91-8</td>
<td>REL: Recommended exposure limit (REL):</td>
<td>40 mg/m³ (10 ppm)</td>
<td>2005</td>
<td>NIOSH/GUIDE: US. NIOSH: Pocket Guide to Chemical Hazards</td>
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<tr>
<td>Cyclohexylamine</td>
<td>108-91-8</td>
<td>TWA: time weighted average</td>
<td>40 mg/m³ (10 ppm)</td>
<td>1989</td>
<td>Z1A: US. OSHA Table Z-1-A (29 CFR 1910.1000)</td>
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<td>Property</td>
<td>Value</td>
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<tr>
<td>Physical state</td>
<td>liquid, clear</td>
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<tr>
<td>Color</td>
<td>yellowish to brownish, clear</td>
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<tr>
<td>Odor</td>
<td>sweet pungent</td>
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<td></td>
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<tr>
<td>pH</td>
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<tr>
<td>Melting point/freezing point</td>
<td>Note: not determined</td>
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</tr>
<tr>
<td>Boiling point/boiling range</td>
<td>110 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>54 °F (12 °C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Method: closed cup</td>
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</tr>
<tr>
<td>Lower explosion limit</td>
<td>1 % (V)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>7.0 % (V)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Vapor pressure</td>
<td>ca. 48 hPa</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>at 30 °C (86 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor density</td>
<td>3.1 Note: Toluene</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>0.87 - 0.89 g/cm³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water solubility</td>
<td>Note: negligible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>536 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION 10. STABILITY AND REACTIVITY

Chemical stability : Stable under recommended storage conditions.

Possibility of hazardous reactions : Hazardous polymerisation does not occur.

Conditions to avoid : Heat, flames and sparks.
                       Keep away from direct sunlight.

Incompatible materials to avoid : Oxidizing agents
                                Strong acids and strong bases
                                Metals

Hazardous decomposition products : In case of fire hazardous decomposition products may be produced such as:
                                   Carbon monoxide
                                   Carbon dioxide (CO2)
                                   Boron oxides
                                   Silicon oxides

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity : Acute toxicity estimate: 1,509 mg/kg
                     Method: Calculation method

Acute inhalation toxicity
Toluene : LC50: 8800 ppm
          Exposure time: 4 h
          Species: Rat

Acute dermal toxicity : Acute toxicity estimate: 2,345 mg/kg
                        Method: Calculation method

Skin irritation
Cyclohexylamine : Species: Rabbit
                  Result: Causes burns.
                  Classification: Corrosive
Eye irritation
Cyclohexylamine : Species: Rabbit
                   Result: Risk of serious damage to eyes.
                   Classification: Corrosive

Repeated dose toxicity
Toluene : Species: Rat
          Application Route: Inhalation
          Exposure time: (15 Weeks)
          Chronic toxicity
          2500 ppm
          Based on experimental results, may cause adverse health effects on the following:
          Heart
          Liver
          Kidney
          Urinary tract
          Bladder

Toluene : Note: In vitro tests did not show mutagenic effects

SECTION 12. ECOLOGICAL INFORMATION

Toxicity to fish
Toluene : LC50: 36.2 mg/l
          Exposure time: 96 h
          Species: Pimephales promelas (fathead minnow)

          LC50: 13 mg/l
          Exposure time: 96 h
          Species: Lepomis macrochirus (Bluegill sunfish)

Cyclohexylamine : static test
                  LC50: 470 mg/l
                  Exposure time: 96 h
                  Species: Danio rerio (zebra fish)
Toxicity to daphnia and other aquatic invertebrates
Toluene : LC50: 313 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)

Cyclohexylamine : EC50: 58 mg/l
Exposure time: 24 h
Species: Daphnia magna (Water flea)

Toxicity to algae
Toluene : LC50: > 100 mg/l
Exposure time: 24 h
Species: Algae

Cyclohexylamine : EC50: 20 mg/l
Exposure time: 96 h
Species: Pseudokirchneriella subcapitata (green algae)

Toxicity to bacteria
Toluene : EC50: 19.7 mg/l
Exposure time: 0.5 h
Species: Photobacterium phosphoreum

Further information on ecology
Additional ecological information : We have no quantitative data concerning the ecological effects of this product.

SECTION 13. DISPOSAL CONSIDERATIONS
Disposal methods : Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION
DOT UN/ID No. : UN 2924
Proper shipping name : FLAMMABLE LIQUID, CORROSIVE, N.O.S. (Toluene, Cyclohexylamine)
### Class, Packing group, and Hazard Labels

<table>
<thead>
<tr>
<th>Class</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing group</td>
<td>II</td>
</tr>
<tr>
<td>Hazard Labels</td>
<td>3 (8)</td>
</tr>
</tbody>
</table>

**IATA**

<table>
<thead>
<tr>
<th>UN/ID No.</th>
<th>UN 2924</th>
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<tbody>
<tr>
<td>Description of the goods</td>
<td>FLAMMABLE LIQUID, CORROSIVE, N.O.S. (Toluene, Cyclohexylamine)</td>
</tr>
<tr>
<td>Class</td>
<td>3</td>
</tr>
<tr>
<td>Packaging group</td>
<td>II</td>
</tr>
<tr>
<td>Hazard Labels</td>
<td>3 (8)</td>
</tr>
<tr>
<td>Packing instruction (cargo aircraft)</td>
<td>363</td>
</tr>
<tr>
<td>Packing instruction (passenger aircraft)</td>
<td>352</td>
</tr>
<tr>
<td>Packing instruction (passenger aircraft)</td>
<td>Y340</td>
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</tbody>
</table>

**IMDG**

<table>
<thead>
<tr>
<th>UN/ID No.</th>
<th>UN 2924</th>
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<tbody>
<tr>
<td>Description of the goods</td>
<td>FLAMMABLE LIQUID, CORROSIVE, N.O.S. (TOLUENE, CYCLOHEXYLAMINE)</td>
</tr>
<tr>
<td>Class</td>
<td>3</td>
</tr>
<tr>
<td>Packaging group</td>
<td>II</td>
</tr>
<tr>
<td>Hazard Labels</td>
<td>3 (8)</td>
</tr>
<tr>
<td>EmS Number</td>
<td>F-E, S-C</td>
</tr>
<tr>
<td>Marine pollutant</td>
<td>no</td>
</tr>
</tbody>
</table>

### SECTION 15. REGULATORY INFORMATION

**Inventories**

- **US. Toxic Substances Control Act**: On TSCA Inventory
- **Australia. Industrial Chemical (Notification and Assessment) Act**: Not in compliance with the inventory
- **Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)**: This product contains one or several components that are not on the Canadian DSL nor NDSL.
Japan. Kashin-Hou Law List: Not in compliance with the inventory

Korea. Toxic Chemical Control Law (TCCL) List: Not in compliance with the inventory

Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act: Not in compliance with the inventory

China. Inventory of Existing Chemical Substances: Not in compliance with the inventory

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand: Not in compliance with the inventory

National regulatory information:

**SARA 302 Components**: The following components are subject to reporting levels established by SARA Title III, Section 302:
- Cyclohexylamine 108-91-8

**SARA 313 Components**: The following components are subject to reporting levels established by SARA Title III, Section 313:
- Toluene 108-88-3

**SARA 311/312 Hazards**: Fire Hazard
- Chronic Health Hazard

**CERCLA Reportable Quantity**: 909 lbs
SAFETY DATA SHEET

Diffusion Technology Boron Spin-On Dopant B-150, B-100, B75X, B-49

California Prop. 65 : WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
      Toluene 108-88-3

Massachusetts RTK : Toluene 108-88-3
      Cyclohexylamine 108-91-8

New Jersey RTK : Toluene 108-88-3
      Cyclohexylamine 108-91-8

Pennsylvania RTK : Toluene 108-88-3
      Cyclohexylamine 108-91-8

WHMIS Classification : B2: Flammable liquid
      D2A: Very Toxic Material Causing Other Toxic Effects
      D2B: Toxic Material Causing Other Toxic Effects
      E: Corrosive Material

SECTION 16. OTHER INFORMATION

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a...
guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.

Previous Issue Date: 10/24/2014
Prepared by Honeywell Performance Materials and Technologies  Product Stewardship Group