SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Genesolv® SF
MSDS Number : 000000011248
Product Use Description : Solvent

Company : Honeywell International, Inc.
101 Columbia Road
Morristown, NJ 07962-1057

For more information call : 800-522-8001
(Monday-Friday, 9:00am-5:00pm)

In case of emergency call :
Medical: 1-800-498-5701 or +1-651-523-0309
Transportation: 1-800-424-9300 or +1-703-527-3887
(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form : Liquefied gas
Color : colourless
Odor : slight sweet ether-like

Hazard Summary : WARNING! Contains gas under pressure; may explode if heated. This product is not flammable at ambient temperatures and atmospheric pressure. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating. Inhalation may cause central nervous system effects. May cause cardiac arrhythmia. May cause drowsiness and dizziness. Do not breathe vapour. May cause eye irritation. Avoid contact with skin, eyes and clothing. At higher temperatures, (>250 C), decomposition products may include hydrofluoric acid (HF) and carbonyl halides. The ACGIH Threshold Limit Values (2007) for Hydrogen Fluoride are TLV-TWA 0.5 ppm and Ceiling Exposure Limit 2 ppm.

Potential Health Effects

Skin : No skin irritation
Eyes : May cause eye irritation.
Ingestion: Unlikely route of exposure. Effects due to ingestion may include: Gastrointestinal discomfort.

Inhalation: May cause cardiac arrhythmia. Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Vapours may cause drowsiness and dizziness. Inhalation may cause central nervous system effects.

Chronic Exposure: None known.

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>1,1,1,3,3-Pentafluoropropane</td>
<td>460-73-1</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

Inhalation: Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.

Skin contact: After contact with skin, wash immediately with plenty of water. If symptoms persist, call a physician. Take off all contaminated clothing immediately. Wash contaminated clothing before re-use.

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

Ingestion: Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Call a physician immediately.

Notes to physician

Treatment: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with
special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

SECTION 5. FIREFIGHTING MEASURES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash point</td>
<td>None</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>412 °C (774 °F)</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>None</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>None</td>
</tr>
<tr>
<td>Suitable extinguishing media</td>
<td>The product is not flammable. ASHRAE 34 Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.</td>
</tr>
<tr>
<td>Specific hazards during firefighting</td>
<td>This product is not flammable at ambient temperatures and atmospheric pressure. However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Exposure to decomposition products may be a hazard to health. In case of fire hazardous decomposition products may be produced such as: Hydrogen fluoride Carbon monoxide Carbon dioxide (CO2) Carbonyl halides</td>
</tr>
<tr>
<td>Special protective equipment for firefighters</td>
<td>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.</td>
</tr>
</tbody>
</table>

SECTION 6. ACCIDENTAL RELEASE MEASURES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal precautions</td>
<td>Wear personal protective equipment. Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Remove all sources of ignition. Vapours are heavier than air and can cause suffocation by</td>
</tr>
</tbody>
</table>
Environmental precautions: Should not be released into the environment. Do not flush into surface water or sanitary sewer system. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g. by containment or oil barriers).

Methods for cleaning up: 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. Do not get in eyes, on skin, or on clothing. Do not use in areas without adequate ventilation. Perform filling operations only at stations with exhaust ventilation facilities. Open drum carefully as content may be under pressure. Do not breathe vapours or spray mist.

Advice on protection against fire and explosion: Can form a combustible mixture with air at pressures above atmospheric pressure. Keep product and empty container away from heat and sources of ignition.

**Storage**

Requirements for storage areas and containers: Store away from incompatible substances. Keep away from direct sunlight. Keep containers tightly closed in a dry, cool and well-ventilated place. Ensure adequate ventilation, especially in confined areas. Keep in original packaging, tightly closed.

### SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Protective measures**

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

**Engineering measures**

Use with local exhaust ventilation.
Perform filling operations only at stations with exhaust ventilation facilities.

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

Hand protection : Impervious butyl rubber gloves
Neoprene gloves
Gloves must be inspected prior to use.
Replace when worn.

Skin and body protection : Wear as appropriate:
Solvent-resistant gloves
Solvent-resistant apron and boots
If splashes are likely to occur, wear:
Protective suit

Respiratory protection : In case of insufficient ventilation, wear suitable respiratory equipment.
Wear a positive-pressure supplied-air respirator.
For rescue and maintenance work in storage tanks use self-contained breathing apparatus.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.
Avoid contact with skin, eyes and clothing.
Ensure adequate ventilation, especially in confined areas.
Remove and wash contaminated clothing before re-use.
Contaminated work clothing should not be allowed out of the workplace.
Keep working clothes separately.
Wash hands before breaks and immediately after handling the product.

Exposure Guidelines

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Exposure Limit</th>
<th>TWA</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1,3,3-Pentafluoropropane</td>
<td>460-73-1</td>
<td>WEEL TWA</td>
<td>300 ppm</td>
<td>1,644 mg/m3</td>
</tr>
</tbody>
</table>

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form : Liquefied gas
Color : Colourless
Odor : Slight sweet ether-like
Molecular Weight : 134 g/mol
pH : neutral

Freezing point : <-103 °C (-153 °F)

Boiling point/boiling range : 15 °C (59 °F)

Vapor pressure : 1,227 hPa
   at 20 °C (68 °F)

Vapor pressure : 3,882 hPa
   at 54.4 °C (129.9 °F)

Relative vapour density : 4.6
   (Air = 1.0)

Density : 1.32 g/cm³
   at 20 °C (68 °F)

Water solubility : 7.8 g/l
   at 20 °C (68 °F)

Partition coefficient:
   n-octanol/water : log Pow: 1.35
   at: 21.5 °C (70.7 °F)

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid : Protect from heat/overheating.
   Keep away from direct sunlight.
   Heat, flames and sparks.

Materials to avoid : Strong acids and strong bases
   Finely divided aluminium
   Sodium
   Potassium
   Calcium
   Magnesium
   Zinc
   Barium
   Lithium
   Strong oxidizing agents

Hazardous decomposition products : In case of fire hazardous decomposition products may be produced such as:
   Carbon monoxide
   Carbon dioxide (CO2)
   Carbonyl halides
   Hydrogen fluoride

Thermal decomposition : >250 °C

Hazardous reactions : Hazardous polymerisation does not occur.
   Stable under normal conditions.
SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity:
- LC50: > 200000 ppm
- Exposure time: 4 h
- Species: rat
- Note: No deaths Evidence of transient anesthetic effect.

- LC50: > 100000 ppm
- Exposure time: 4 h
- Species: mouse
- Note: No deaths Evidence of transient underactivity during exposure.

Acute dermal toxicity:
- LD50: > 2,000 mg/kg
- Species: rabbit

Sensitisation:
- Cardiac sensitization
- Species: dogs
- Note: No effects noted at 35,000 ppm, the threshold for induction of cardiac arrhythmias in the presence of injected adrenalin was 44,000 ppm. no data available

Repeated dose toxicity:
- Species: rat
  - NOAEL (No observed adverse effect level): 50000 ppm
  - Method: Embryotoxicity
  - Note: Not a teratogen

- Species: rat (pups)
  - NOAEL (No observed adverse effect level): 50000 ppm

- Species: rat (dams)
  - NOAEL (No observed adverse effect level): 2000 ppm
  - Note: due to decrease in body weight gains at 10,000 ppm and 50,000 ppm

- Species: rat
  - Method: 2 Generation Inhalation Toxicity
  - Note: Exposures 6hrs/day, 7 days/wk at 0(control), 2000, 10,000 and 50,000 ppm.

- Species: rat (dams)
  - Note: Toxicity seen in dams at 10,000 and 50,000 ppm and in pups at 50,000 ppm. Increased mortality late in the lactation phase of the study.

- Species: rat
Note: 28-day Inhalation Study NOAEL (No observed adverse effect level) - 50,000 ppm NOEL - 500 ppm
Dose levels: 0, 500, 2000, 10,000 and 50,000 ppm

: Species: rat
Note: 90-day Inhalation Study Dose levels: 0, 500, 2000, 10,000 and 50,000 ppm NOAEL (No observed adverse effect level) - 2,000 ppm

Note: Overall, subchronic studies showed dose-related increases in urinary fluoride levels, urine volumes and water consumption. Increases were noted in hematological parameters, BUN levels and serum liver enzyme activities (GOT, GPT). These increases did not follow a dose response; however, they indicate that HFC-245fa is metabolized in the liver. Significant recovery was noted in these parameters following a 2-week, non-exposure period which followed the 28-day exposure period. No histopathological effects were noted in the 28-day study. The 90-day study noted an increase in incidence and severity (trace to moderate) of myocarditis (inflammation of the heart muscle) at 10,000 and 50,000 ppm. This was not noted at the 500 or 2,000 ppm dose levels nor was it seen the 28-day study at 50,000 ppm.

Genotoxicity in vitro
: Cell type: Human lymphocytes
Result: Weak positive activation without S9 at 30% v/v; not active with S9 up to 70% v/v.

: Test Method: Ames test
Metabolic activation: with or without metabolic activation
Result: negative

Genotoxicity in vivo
: Species: mouse
Cell type: Bone marrow
Application Route: Inhalation
Method: Mutagenicity (micronucleus test)
Result: negative

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Toxicity to fish
: EC50: > 81.8 mg/l
Exposure time: 96 h
Species: Oncorhynchus mykiss (rainbow trout)

: NOEC: > 10 mg/l
Exposure time: 96 h
Species: Oncorhynchus mykiss (rainbow trout)
Toxicity to daphnia and other aquatic invertebrates.

- EC50: > 97.9 mg/l
  Exposure time: 48 h
  Species: Daphnia

- NOEC: > 97.9 mg/l
  Exposure time: 48 h
  Species: Daphnia magna (Water flea)

Toxicity to algae

- Growth inhibition
- EC50: > 118 mg/l
  Species: Algae
  Method: OECD Test Guideline 201

Further information on ecology

Additional ecological information:

This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82. This product contains greenhouse gases which may contribute to global warming. Do NOT vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered. Refer to sections 610 and 612 for list of acceptable and unacceptable uses for this product.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Information: Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>DOT</th>
<th>UN/ID No.</th>
<th>LIQUEFIED GAS, N.O.S. (1,1,1,3,3-Pentafluoropropane)</th>
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<tbody>
<tr>
<td>UN/ID No.</td>
<td>3163</td>
<td>LIQUEFIED GAS, N.O.S. (1,1,1,3,3-Pentafluoropropane)</td>
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<tr>
<td>Proper shipping name</td>
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<td>Packing group</td>
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<td>LIQUEFIED GAS, N.O.S. (1,1,1,3,3-Pentafluoropropane)</td>
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<td>Hazard Labels</td>
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<th>LIQUEFIED GAS, N.O.S. (1,1,1,3,3-Pentafluoropropane)</th>
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<tr>
<td>UN/ID No.</td>
<td>3163</td>
<td>LIQUEFIED GAS, N.O.S. (1,1,1,3,3-Pentafluoropropane)</td>
</tr>
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<td>Description of the goods</td>
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<td>Class</td>
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<tr>
<td>Hazard Labels</td>
<td>2.2</td>
<td>LIQUEFIED GAS, N.O.S. (1,1,1,3,3-Pentafluoropropane)</td>
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<tr>
<td>Packing instruction (cargo aircraft)</td>
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<td>LIQUEFIED GAS, N.O.S. (1,1,1,3,3-Pentafluoropropane)</td>
</tr>
<tr>
<td>Packing instruction (passenger aircraft)</td>
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<td>LIQUEFIED GAS, N.O.S. (1,1,1,3,3-Pentafluoropropane)</td>
</tr>
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</table>
Material Safety Data Sheet

Genesolv SF 50lb/22.7kg Jug

Version 2  Revision Date 02/16/2012

IMDG

<table>
<thead>
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<th>UN/ID No.</th>
<th>UN 3163</th>
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<td>Description of the goods</td>
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<tr>
<td>Class</td>
<td>2.2</td>
</tr>
<tr>
<td>Hazard Labels</td>
<td>2.2</td>
</tr>
<tr>
<td>EmS Number</td>
<td>F-C</td>
</tr>
<tr>
<td>Marine pollutant</td>
<td>no</td>
</tr>
</tbody>
</table>

SECTION 15. REGULATORY INFORMATION

Inventories

1907/2006 (EU) : This mixture contains only ingredients which have been registered according to Regulation (EC) No. 1907/2006 (REACH).

US. Toxic Substances Control Act : On TSCA Inventory

Australia. Industrial Chemical (Notification and Assessment) Act : On the inventory, or in compliance with the inventory


Japan. Kashin-Hou Law List : On the inventory, or in compliance with the inventory

Korea. Existing Chemicals Inventory (KECI) : On the inventory, or 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 : 1,1,1,3,3-Pentafluoropropane 460-73-1

NZIOC - New Zealand : On the inventory, or in compliance with the inventory

National regulatory information

SARA 311/312 Hazards : Acute Health Hazard
Sudden Release of Pressure Hazard
California Prop. 65: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

WHMIS Classification: A
This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

<table>
<thead>
<tr>
<th>SECTION 16. OTHER INFORMATION</th>
<th>HMIS III</th>
<th>NFPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health hazard</td>
<td>2</td>
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</tr>
<tr>
<td>Flammability</td>
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<td>1</td>
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<tr>
<td>Physical Hazard</td>
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<td></td>
</tr>
<tr>
<td>Instability</td>
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</table>