

**Genetron® ST-20 Flush**

Version 1

Revision Date 06/23/2011

Print Date 06/24/2011

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : Genetron® ST-20 Flush  
MSDS Number : 00000013778  
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 : liquid  
Color : colourless  
Odor : slight sweet ether-like

Hazard Summary : 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. Irritating to eyes and skin. May be harmful if swallowed. 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 : Irritating to skin.

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- Eyes** : Irritating to eyes.
- Ingestion** : May be harmful if swallowed.  
May cause systemic poisoning with symptoms paralleling those of inhalation.
- Inhalation** : 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.  
Vapours may cause drowsiness and dizziness.  
Effects of breathing high concentrations of vapour may include:  
Cardiac arrhythmias
- Chronic Exposure** : None known.
- Target Organs** : Central nervous system  
Heart  
Liver

**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**

| Chemical Name                | CAS-No.  | Concentration   |
|------------------------------|----------|-----------------|
| 1,1,1,3,3-Pentafluoropropane | 460-73-1 | 40.00 - 70.00 % |
| 1,1,1,2-Tetrafluoroethane    | 811-97-2 | 10.00 - 30.00 % |
| trans-Dichloroethylene       | 156-60-5 | 10.00 - 30.00 % |

**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.

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- 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. FIRE-FIGHTING MEASURES**

- Flash point : not applicable
- Lower explosion limit : None
- Upper explosion limit : None
- Suitable extinguishing media : The product is not flammable. ASTM D 56-87  
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.  
Cool closed containers exposed to fire with water spray.
- Specific hazards during fire fighting : 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.  
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:  
Carbon monoxide  
Carbon dioxide (CO<sub>2</sub>)

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Additional advice : Carbonyl halides  
Gaseous hydrogen chloride (HCl).  
Gaseous hydrogen fluoride (HF).

: This product is a mixture of a low-boiling non-flammable component and a flammable component. In the event of a liquid spill, the low-boiling non-flammable component will evaporate from the mixture faster, leaving a mixture enriched with the flammable component. The enriched mixture may be flammable.  
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

Personal precautions : 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 reducing oxygen available for breathing.  
Ensure adequate ventilation.

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 : Wear personal protective equipment.  
Do not breathe vapours or spray mist.  
Avoid contact with skin, eyes and 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.

Advice on protection : Can form a combustible mixture with air at pressures above

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against fire and explosion

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.  
Protect from physical damage.

## 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 : 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.

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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**

|                              |          |           |     |           |                         |
|------------------------------|----------|-----------|-----|-----------|-------------------------|
| 1,1,1,3,3-Pentafluoropropane | 460-73-1 | WEEL      | TWA | 300 ppm   | 1,644 mg/m <sup>3</sup> |
| 1,1,1,2-Tetrafluoroethane    | 811-97-2 | HONEYWELL | TWA |           | 1,000 ppm               |
|                              |          | WEEL      | TWA | 1,000 ppm | 4,240 mg/m <sup>3</sup> |
| trans-Dichloroethylene       | 156-60-5 | ACGIH     | TWA |           | 200 ppm                 |
|                              |          | NIOSH     | REL | 200 ppm   | 790 mg/m <sup>3</sup>   |
|                              |          | OSHA Z1   | PEL | 200 ppm   | 790 mg/m <sup>3</sup>   |
|                              |          | OSHA Z1A  | TWA | 200 ppm   | 790 mg/m <sup>3</sup>   |

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

Form : liquid  
 Color : colourless  
 Odor : slight sweet ether-like  
 pH : neutral  
 Freezing point : not determined  
 Boiling point/boiling range : 15 °C (59 °F)  
 Vapor pressure : 1,310 hPa  
 at 20 °C (68 °F)

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|  |   |   |
|--|---|---|
| Relative vapour density                | : | not determined  |
| Density                                | : | not determined  |
| Water solubility                       | : | not determined  |
| Partition coefficient: n-octanol/water | : | log Pow: 1.35<br>1,1,1,3,3-pentafluoropropane (HFC-245fa) |
| Partition coefficient: n-octanol/water | : | log Pow: 1.06<br>1,1,1,2-tetrafluoroethane (HFC-134a)     |

**SECTION 10. STABILITY AND REACTIVITY**

|                                  |   |  |
|----------------------------------|---|--|
| Conditions to avoid              | : | Protect from heat/overheating.<br>Keep away from direct sunlight.<br>Heat, flames and sparks.      |
| Materials to avoid               | : | Calcium<br>Magnesium<br>Aluminium<br>Zinc<br>Potassium<br>Finely divided aluminium                 |
| Hazardous decomposition products | : | Halogenated compounds<br>Carbonyl halides<br>Carbon dioxide (CO <sub>2</sub> )<br>Hydrogen halides |
| Hazardous reactions              | : | Hazardous polymerisation does not occur.<br>Stable under normal conditions.                        |

**SECTION 11. TOXICOLOGICAL INFORMATION**

Acute oral toxicity  
trans-Dichloroethylene : LD50: 1,235 mg/kg  
Species: rat

Acute inhalation toxicity

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- 1,1,1,3,3-Pentafluoropropane : 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.
- 1,1,1,2-Tetrafluoroethane : LC50: > 500000 ppm  
Exposure time: 4 h  
Species: rat
- trans-Dichloroethylene : LC50: > 24100 ppm  
Exposure time: 4 h  
Species: rat
- Acute dermal toxicity  
1,1,1,3,3-Pentafluoropropane : LD50: > 2,000 mg/kg  
Species: rabbit
- trans-Dichloroethylene : LD50: > 5,000 mg/kg  
Species: rabbit
- Skin irritation  
trans-Dichloroethylene : Species: rabbit  
Result: Moderate skin irritation
- Eye irritation  
trans-Dichloroethylene : Species: rabbit  
Result: Moderate eye irritation
- Sensitisation  
1,1,1,3,3-Pentafluoropropane : 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.
- 1,1,1,2-Tetrafluoroethane : Cardiac sensitization  
Species: dogs  
Note: No-observed-effect level

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50 000 ppm  
Lowest observable effect level  
75 000 ppm

## Repeated dose toxicity

1,1,1,3,3-Pentafluoropropane

: Species: rat  
NOEL: 50000 ppm  
Embryotoxicity  
Not a teratogen

Species: rat (pups)  
NOEL: 50000 ppm

Species: rat (dams)  
NOEL: 2000 ppm  
due to decrease in body weight gains at 10,000 ppm and  
50,000 ppm

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

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

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

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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.

1,1,1,2-Tetrafluoroethane : Species: rat  
NOEL: 40000 ppm

trans-Dichloroethylene : Species: rat  
NOEL: 4000 ppm  
90-day Inhalation Study

Species: rat  
Method: Embryotoxicity  
Not a teratogen  
Foetal toxicity  
at maternally toxic concentrations.

Species: rat (pups)  
NOEL: 12000 ppm  
Skeletal malformation  
decrease in body weight

Species: rat (dams)  
NOEL: 6000 ppm

### Genotoxicity in vitro

1,1,1,3,3-Pentafluoropropane : Cell type: Human lymphocytes  
Result: Weak positive activation without S9 at 30% v/v; not active with S9 up to 70% v/v.

1,1,1,2-Tetrafluoroethane : Note: In vitro tests did not show mutagenic effects

trans-Dichloroethylene : Note: In vitro tests did not show mutagenic effects

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

### Genotoxicity in vivo

1,1,1,3,3-Pentafluoropropane : Species: mouse  
Cell type: Bone marrow  
Application Route: Inhalation  
Method: Mutagenicity (micronucleus test)  
Result: negative

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Further information : Note: Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite. Avoid skin contact with leaking liquid (danger of frostbite).

**SECTION 12. ECOLOGICAL INFORMATION**

## Toxicity to fish

1,1,1,3,3-Pentafluoropropane : 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.

1,1,1,3,3-Pentafluoropropane : 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

1,1,1,3,3-Pentafluoropropane : 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. Further information on ecology

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**SECTION 13. DISPOSAL CONSIDERATIONS**

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

**SECTION 14. TRANSPORT INFORMATION**

**DOT** UN/ID No. : UN 1950  
 Proper shipping name : Aerosols, non-flammable  
 Class : 2.2  
 Packing group :  
 Hazard Labels : 2.2

**IATA** UN/ID No. : UN 1950  
 Description of the goods : Aerosols, non-flammable  
 Class : 2.2  
 Hazard Labels : 2.2  
 Packing instruction (cargo aircraft) : 203  
 Packing instruction (passenger aircraft) : 203  
 Packing instruction (passenger aircraft) : Y203

**IMDG** UN/ID No. : UN 1950  
 Description of the goods : Aerosols, non-flammable  
 Class : 2.2  
 Hazard Labels : 2.2  
 EmS Number : F-D  
 Marine pollutant : no

**SECTION 15. REGULATORY INFORMATION****Inventories**

1907/2006 (EU) : On the inventory, or in compliance with the inventory

US. Toxic Substances Control Act : On TSCA Inventory

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

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Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 144) : All components of this product are on the Canadian DSL list.

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

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  
: On the inventory, or in compliance with the inventory

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand : On the inventory, or in compliance with the inventory

### National regulatory information

**SARA 313 Components** : trans-Dichloroethylene 156-60-5

**SARA 311/312 Hazards** : Acute Health Hazard  
Sudden Release of Pressure Hazard

**CERCLA Reportable Quantity** : 6452 lbs

**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.

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**Massachusetts RTK** : trans-Dichloroethylene 156-60-5**New Jersey RTK** : trans-Dichloroethylene 156-60-5**Pennsylvania RTK** : trans-Dichloroethylene 156-60-5**WHMIS Classification** : D2B  
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.

**SECTION 16. OTHER INFORMATION**

|                 | <b>HMIS III</b> | <b>NFPA</b> |
|-----------------|-----------------|-------------|
| Health hazard   | : 2             | 2           |
| Flammability    | : 1             | 1           |
| Physical Hazard | : 1             |             |
| Instability     | :               | 1           |