

**DuPont™ Vertrel® SMT specialty fluid**

Version 2.0

Revision Date 01/27/2015

Ref. 130000000633

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : DuPont™ Vertrel® SMT specialty fluid  
Product Use : Cleaning agent, For professional users only.

Restrictions on use : Do not use product for anything outside of the above specified uses  
Manufacturer/Supplier : DuPont  
1007 Market Street  
Wilmington, DE 19898  
United States of America

Product Information : 1-800-441-7515 (outside the U.S. 1-302-774-1000)  
Medical Emergency : 1-800-441-3637 (outside the U.S. 1-302-774-1139)  
Transport Emergency : CHEMTREC: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

**SECTION 2. HAZARDS IDENTIFICATION****Product hazard category**

Acute toxicity (Oral)	Category 4
Serious eye damage/eye irritation	Category 2B
Specific target organ toxicity - single exposure	Category 1
Specific target organ toxicity - single exposure	Category 3

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**Label content**

Pictogram

:



Signal word

: Danger

Hazardous warnings

: Harmful if swallowed.  
Causes eye irritation.  
May cause respiratory irritation.  
May cause drowsiness or dizziness.  
Causes damage to organs. (Central nervous system, Eyes)

Hazardous prevention measures

: 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.  
IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.  
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
IF exposed: Call a POISON CENTER or doctor/ physician.  
Rinse mouth.  
If eye irritation persists: Get medical advice/ attention.  
Store in a well-ventilated place. Keep container tightly closed.  
Store locked up.  
Dispose of contents/ container to an approved waste disposal plant.

**Other hazards**

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Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing., Prolonged skin contact may defat the skin and produce dermatitis., Effects of breathing high concentrations of vapour may include:, May cause cardiac arrhythmia., Misuse or intentional inhalation abuse may lead to death without warning.

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

Component	CAS-No.	Concentration
1,1,1,2,2,3,4,5,5,5-Decafluoropentane	138495-42-8	49 - 55 %
trans-Dichloroethylene	156-60-5	40 - 46 %
Methanol	67-56-1	2 - 6 %
Nitromethane	75-52-5	0.05 - 0.7 %

**SECTION 4. FIRST AID MEASURES**

- General advice : Never give anything by mouth to an unconscious person. Victim to lie down in the recovery position, cover and keep him warm. Give oxygen or artificial respiration if needed. When symptoms persist or in all cases of doubt seek medical advice.
- Inhalation : Remove from exposure, lie down. Move to fresh air. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.
- Skin contact : Take off all contaminated clothing immediately. Wash off with warm water.



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- Eye contact : Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Get medical attention. Remove contact lenses, if present and easy to do. Continue rinsing.
- Ingestion : Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Drink 1 or 2 glasses of water. If vomiting occurs, have victim lean forward to reduce the risk of aspiration. Consult a physician.
- Most important symptoms/effects, acute and delayed : Dizziness
- Protection of first-aiders : If potential for exposure exists refer to Section 8 for specific personal protective equipment.
- Notes to physician : Do not give adrenaline or similar drugs.

**SECTION 5. FIREFIGHTING MEASURES**

- Suitable extinguishing media : Water spray, Water mist, Dry chemical, Carbon dioxide (CO2)
- Unsuitable extinguishing media : No applicable data available.
- Specific hazards : Fire or intense heat may cause violent rupture of packages. The product is not flammable. Vapours may form flammable mixture with air. Hazardous combustion products: Hydrogen fluoride Fluorinated hydrocarbons Carbonyl fluoride Carbon oxides Hydrogen chloride
- Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire. Exposure to decomposition products may be a hazard to health.
- Further information : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Evacuate personnel to safe areas. Cool containers/tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

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**SECTION 6. ACCIDENTAL RELEASE MEASURES**

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

- Safeguards (Personnel) : Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect. In case of insufficient ventilation, wear suitable respiratory equipment. Refer to protective measures listed in sections 7 and 8.
- Environmental precautions : Prevent further leakage or spillage. Prevent spreading over a wide area (e.g. by containment or oil barriers). Should not be released into the environment. Do not allow contact with soil, surface or ground water.
- Spill Cleanup : 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).
- Accidental Release Measures : No applicable data available.

**SECTION 7. HANDLING AND STORAGE**

- Handling (Personnel) : Avoid contact with skin, eyes and clothing. Avoid breathing vapours or mist. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see section 8.  
Handle in accordance with good industrial hygiene and safety practice. When using do not eat, drink or smoke. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
- Handling (Physical Aspects) : Material should not be dispensed from its container by pouring, except for small sample containers where fume hoods or where other ventilation is used to manage the exposure limits. The use of a drum pump is recommended for dispensing from shipping containers.
- Dust explosion class : Not applicable
- Storage : Protect from contamination. Drainage facilities should be constructed for containment of small spills. Keep container tightly closed in a dry and well-



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ventilated place. Store in original container. Avoid freezing temperatures. If stored below -10°C (14°F), mix prior to use.

Storage period : No applicable data available.

Storage temperature : < 52 °C (< 126 °F)

**SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

Engineering controls : Use sufficient ventilation to keep employee exposure below recommended limits.

Personal protective equipment

Respiratory protection : For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Hand protection : Material: Solvent-resistant gloves

Eye protection : Safety glasses with side-shields Additionally wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.

Skin and body protection : Protective suit

Exposure Guidelines  
Exposure Limit Values

1,1,1,2,2,3,4,5,5,5-Decafluoropentane  
AEL \* (DUPONT) 200 ppm 8 & 12 hr. TWA

AEL \* (DUPONT) 400 ppm Ceiling Limit Value:

trans-Dichloroethylene  
Permissible exposure limit: (OSHA) 200 ppm 790 mg/m3 8 hr. TWA



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TLV	(ACGIH)	200 ppm	TWA
AEL *	(DUPONT)	200 ppm	8 & 12 hr. TWA

Methanol Permissible exposure limit:	(OSHA)	200 ppm	260 mg/m3	8 hr. TWA
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TLV	(ACGIH)	200 ppm	TWA
TLV	(ACGIH)	250 ppm	STEL
AEL *	(DUPONT)	200 ppm	8 & 12 hr. TWA, Skin

Nitromethane Permissible exposure limit:	(OSHA)	100 ppm	250 mg/m3	8 hr. TWA
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TLV	(ACGIH)	20 ppm	TWA
AEL *	(DUPONT)	10 ppm	8 & 12 hr. TWA

Biological Exposure Indices

Methanol BEI	(ACGIH)	15 mg/l Methanol/Urine Sampling time: End of shift.
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\* AEL is the Manufacturer's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

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**Appearance (Physical state, form, colour, etc.)**

Form	: liquid
Color	: colourless
Odor	: ether-like
Odor threshold	: No applicable data available.
pH	: neutral
Melting point/freezing point	: Melting point/range < -50.0 °C (< -58.0 °F)
Boiling point/boiling range	: Boiling point/boiling range 37.0 °C (98.6 °F) at 1,013 hPa
Flash point	: Method: ASTM D 56 does not flash
Evaporation rate	: No applicable data available.
Flammability (solid, gas)	: No applicable data available.
Upper explosion limit	: 15.0 vol%
Lower explosion limit	: 7.0 vol%
Vapor pressure	: 220 hPa at 0 °C (32 °F) : 647.0 hPa at 25 °C (77 °F) : 1,522 hPa at 50 °C (122 °F)
Vapor density	: 4.4 (Air = 1.0)
Density	: 1.42 g/cm <sup>3</sup> at 0 °C (32 °F)
Density	: 1.37 g/cm <sup>3</sup> at 25 °C (77 °F)
Density	: 1.31 g/cm <sup>3</sup> at 50 °C (122 °F)
Specific gravity (Relative density)	: No applicable data available.
Bulk density	: No applicable data available.
Water solubility	: 3.4 g/l at 25 °C (77 °F)
Solubility(ies)	: No applicable data available.
Partition coefficient: n-octanol/water	: No applicable data available.
Auto-ignition temperature	: No applicable data available.
Decomposition temperature	: No applicable data available.



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Viscosity : 0.47 mPa.s at 25 °C (77 °F)

**SECTION 10. STABILITY AND REACTIVITY**

- Reactivity : Stable at normal ambient temperature and pressure.
- Chemical stability : The product is chemically stable.  
No decomposition if stored and applied as directed.
- Possibility of hazardous reactions : No applicable data available.
- Conditions to avoid : Avoid open flames and high temperatures.
- Incompatible materials : Alkali metals Alkaline earth metals, Powdered metals, Powdered metal salts, Nitrogen oxides (NOx), Acids, bases and strong oxidizing agents, Oxygen
- Hazardous decomposition products : Hazardous decomposition products formed under fire conditions.: Fluorinated hydrocarbons, Hydrogen fluoride, Carbon dioxide (CO<sub>2</sub>), Carbon monoxide, Hydrogen chloride gas, Carbonyl fluoride

**SECTION 11. TOXICOLOGICAL INFORMATION**

- 1,1,1,2,2,3,4,5,5,5-Decafluoropentane
- Inhalation 4 h LC50 : 114 mg/l , Rat  
Central nervous system effects  
Convulsions
- Dermal LD50 : > 5,000 mg/kg , Rabbit
- Oral LD50 : > 5,000 mg/kg , Rat
- Skin irritation : No skin irritation, Rabbit
- Eye irritation : No eye irritation, Rabbit
- Skin sensitization : Did not cause sensitisation on laboratory animals., Guinea pig


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- Repeated dose toxicity : Inhalation  
Rat  
-  
No toxicologically significant effects were found.
- Mutagenicity : Tests on bacterial or mammalian cell cultures did not show mutagenic effects.  
Animal testing did not show any mutagenic effects.
- Reproductive toxicity : No toxicity to reproduction  
Animal testing showed no reproductive toxicity.
- Teratogenicity : Animal testing showed no developmental toxicity.

trans-Dichloroethylene  
Inhalation 4 h LC50

- : 95.4 mg/l , Rat  
Target Organs: Central nervous system  
Central nervous system depression
- Dermal LD50 : > 5,000 mg/kg , Rabbit
- Oral LD50 : 2,122 mg/kg , Mouse  
Target Organs: Central nervous system  
Central nervous system depression
- Skin irritation : Mild skin irritation, Rabbit
- Eye irritation : Irritation to eyes, reversing within 7 days, Rabbit
- Repeated dose toxicity : Inhalation  
Rat  
-  
No toxicologically significant effects were found.
- Oral  
Rat  
-  
No toxicologically significant effects were found.
- Mutagenicity : Animal testing did not show any mutagenic effects.  
Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

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Teratogenicity : Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.

Further information : Cardiac sensitisation threshold limit : 793047 mg/m3

## Methanol

Inhalation Acute toxicity estimate : 3 mg/l , animals (unspecified species)  
Target Organs: Central nervous system, Eye  
Central nervous system effects  
narcosis  
eye effects

Dermal Acute toxicity estimate : 300 mg/kg , animals (unspecified species)  
Target Organs: Central nervous system, Eye  
Central nervous system effects  
narcosis  
eye effects

Oral Acute toxicity estimate : 100 mg/kg , animals (unspecified species)  
Target Organs: Central nervous system, Eye  
Central nervous system effects  
narcosis  
eye effects

Skin irritation : Slight or no skin irritation, Rabbit

Eye irritation : slight irritation, Rabbit

Skin sensitization : Did not cause sensitisation on laboratory animals., Guinea pig

Carcinogenicity : Not classifiable as a human carcinogen.  
Overall weight of evidence indicates that the substance is not carcinogenic.

Mutagenicity : Animal testing did not show any mutagenic effects.  
Tests on bacterial or mammalian cell cultures did not show mutagenic effects.  
Overall weight of evidence indicates that the substance is not mutagenic.  
Did not cause genetic damage in animals.  
Genetic damage in cultured mammalian cells was observed in some laboratory tests but not in others.


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Genetic damage in cultured bacterial cells was observed in some laboratory tests but not in others.

- Reproductive toxicity : No toxicity to reproduction  
Evidence suggests the substance is not a reproductive toxin in animals.
- Teratogenicity : Evidence suggests the substance is not a developmental toxin in animals.

## Nitromethane

- Inhalation 4 h Acute toxicity estimate : 14.9 mg/l , Rat  
Target Organs: Respiratory system, Central nervous system  
Vapour  
Respiratory effects  
Bloody nasal discharge  
Central nervous system effects  
Lethargy  
Convulsions
- Dermal LD50 : > 2,000 mg/kg , Rabbit
- Oral LD50 : 1,210 mg/kg , Rat
- Skin irritation : No skin irritation, Rabbit
- Eye irritation : Mild eye irritation, Rabbit
- Skin sensitization : Does not cause skin sensitisation., multiple species
- Repeated dose toxicity : Inhalation  
multiple species  
-  
Target Organs: Blood, Thyroid, Respiratory system  
The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.  
altered hematology, altered blood chemistry, Thyroid effects, Respiratory effects
- Carcinogenicity : Suspected human carcinogens
- Mutagenicity : Tests on bacterial or mammalian cell cultures did not show mutagenic effects.


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Animal testing did not show any mutagenic effects.

Reproductive toxicity : Suspected human reproductive toxicant  
Experiments have shown reproductive toxicity effects in male and female laboratory animals.  
Abnormal sperm  
Abnormal oestrus cycle

## Carcinogenicity

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen.

**SECTION 12. ECOLOGICAL INFORMATION**

## Aquatic Toxicity

## 1,1,1,2,2,3,4,5,5,5-Decafluoropentane

96 h LC50 : Oncorhynchus mykiss (rainbow trout) 13.9 mg/l  
96 h LC50 : Pimephales promelas (fathead minnow) 27.2 mg/l  
96 h LC50 : Danio rerio (zebra fish) 13 mg/l  
72 h EC50 : Pseudokirchneriella subcapitata (green algae) > 120 mg/l  
48 h LC50 : Daphnia magna (Water flea) 11.7 mg/l  
21 d : NOEC Daphnia magna (Water flea) 1.72 mg/l

## trans-Dichloroethylene

96 h LC50 : Lepomis macrochirus (Bluegill sunfish) 74 mg/l  
96 h EC50 : Pseudokirchneriella subcapitata (green algae) 798 mg/l  
48 h LC50 : Daphnia magna (Water flea) 79 mg/l

## Methanol

96 h LC50 : Pimephales promelas (fathead minnow) 28,100 mg/l


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96 h LC50 : Selenastrum capricornutum (green algae) 22,000 mg/l

48 h EC50 : Daphnia (water flea) &gt; 10,000 mg/l

## Nitromethane

96 h LC50 : Pimephales promelas (fathead minnow) 1,710 mg/l

72 h EC50 : Desmodesmus subspicatus (green algae) 36 mg/l

48 h LC50 : Daphnia magna (Water flea) 100 mg/l

## Environmental Fate

## 1,1,1,2,2,3,4,5,5,5-Decafluoropentane

Biodegradability : Not readily biodegradable.

Bioaccumulation : Bioaccumulation is unlikely.

## trans-Dichloroethylene

Biodegradability : Not biodegradable 8 % OECD Test Guideline 301D

## Methanol

Biodegradability : Readily biodegradable

Bioaccumulation : Bioaccumulation is unlikely.

## Nitromethane

Biodegradability : Not readily biodegradable.

Bioaccumulation 3 d : Leuciscus idus (Golden orfe) 50 ug/L  
Bioconcentration factor (BCF) : 1.4  
Bioaccumulation is unlikely.Bioaccumulation 1 d : 50 ug/L  
Bioconcentration factor (BCF) : 960  
Bioaccumulation is unlikely.**SECTION 13. DISPOSAL CONSIDERATIONS**

Waste disposal methods - : Can be used after re-conditioning. If recycling is not practicable, dispose of in

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Product compliance with local regulations. The product should not be allowed to enter drains, water courses or the soil.

Contaminated packaging : If recycling is not practicable, dispose of in compliance with local regulations.

**SECTION 14. TRANSPORT INFORMATION**

Not classified as dangerous in the meaning of transport regulations.

**SECTION 15. REGULATORY INFORMATION**

TSCA : 1,1,1,2,2,3,4,5,5,5-DECAFLUOROPENTANE (CAS# 138495-42-8) is controlled by TSCA Section 5, Significant New Use Rule (SNUR; 40 CFR 721.5645) The approved uses are: precision and general cleaning, carrier fluid, displacement drying, printed circuit board cleaning, particulate removal and film cleaning, process medium, heat transfer fluid (dielectric and non-dielectric), and test fluid. Processors and users of this substance must also comply with the applicable general SNUR requirements set forth in 40 CFR 721 subpart A, including export notification requirements if applicable (40 CFR 721.20), and the applicable record keeping requirements set forth at 40 CFR 721.125.

SARA 313 Regulated Chemical(s) : trans-Dichloroethylene, Methanol

PA Right to Know Regulated Chemical(s) : Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): trans-Dichloroethylene, Methanol

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NJ Right to Know Regulated Chemical(s)	: Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): trans-Dichloroethylene, Methanol
CERCLA Reportable Quantity	: 2333 lbs Based on the percentage composition of this chemical in the product.: trans-Dichloroethylene
California Prop. 65	: WARNING! This product contains a chemical or chemicals known to the State of California to cause cancer.Nitromethane WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.Methanol

**SECTION 16. OTHER INFORMATION**

Before use read DuPont's safety information.

For further information contact the local DuPont office or DuPont's nominated distributors.

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Revision Date : 01/27/2015

Contact person : MSDS Coordinator, DuPont Chemicals and Fluoroproducts, Wilmington, DE  
19898, (800) 441-7515

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.

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