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Vertrel™ SDG

Specialty Fluid

Technical Information

Precision Cleaning and Degreasing

Introduction

Vertrel™ SDG is an engineered mixture of nonflammable hydrofluorocarbons (HFCs) and trans-1,2-dichloroethylene (t-DCE).

Vertrel™ SDG is designed to replace trichloroethylene (TCE) and n-propyl bromide (nPB); and perform in applications where maximum cleaning power is needed. It can also be used as a substitute for other cleaners such HCFC-225 and its blends, HCFC-141b, HFEs, PFCs, CFCs, and aqueous cleaners when safety and environmental concerns and/or floor space and cleanliness are at a premium.

Vertrel™ SDG has excellent solvency power for a wide range of soils including oils, greases, waxes and hydraulic fluids. The high solvency power, low surface tension and non-flammability properties of Vertrel™ SDG make it an ideal ultrasonic vapor degreasing solvent.

Features and Benefits

Vertrel™ SDG does a good job balancing performance with favorable environmental and worker safety properties.

- Excellent solvency power (KB Value = 95): Superior cleaning performance
- Good solvency for silicone fluids
- Fast drying: Increases productivity
- Low surface tension: Able to penetrate and clean tight areas
- Compatible with most plastics, elastomers, and metals
- Can be used with ultrasonics
- Nonflammable
- Low toxicity
- Zero ozone depletion potential
- Low global warming potential
- Existing equipment can be used with minor or no modification
- No surfactants needed: Residue free cleaning is promoted.

Typical Applications

Vertrel™ SDG is ideal for a wide range of cleaning applications including:

- Oil, grease, and wax removal
- Silicone carrier fluid
- Silicone grease removal
- Precision Cleaning

Specification Conformity Tests

Vertrel™ SDG has been tested in a variety of industry tests, including:
Boeing D6-17487 Revision P
Solvent Cleaners; General Cleaning

ARP 1755 B
Effect of Cleaning Agent on Aircraft Engine Materials

Douglas Aircraft Company
Type 1: Materials and Procedures for General Exterior Cleaning of Painted and Unpainted Surfaces. (General Purpose Cleaner)

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Environmental

Vertrel™ SDG has “zero” ozone depletion potential and low global warming potential. See table below for various environmental properties of Vertrel™ SDG. Vertrel™ SDG is accepted by the US Environmental Protection Agency under the Significant New Alternatives Policy (SNAP) program as a substitute for ozone-depleting substances (solvent category). It is not SNAP approved for aerosol packages.

Environmental Property	Vertrel™ SDG
Ozone-Depletion Potential (ODP)	0
Global Warming Potential (GWP/100yr ITH)*	148
Volatile Organic Compounds (VOC, g/liter)	1150

* based on IPCC Second Assessment Report values

All components are listed in the TSCA inventory. Refer to the SDS for regulatory information.

Table1
Physical Properties

Property	Vertrel™ SDG	HCFC-225 ca/cb	Novec™ HFE-72DE	TCE	nPB	CFC-113	HCFC-141b
Boiling Point, °C	43	54	43	87	71	48	32
°F	109	129	109	189	160	118	90
Freezing Point, °C	<–50	–131	–	–86	<–76	–35	–103.5
°F	<–58	–204	–	–123	<–105	–31	–154.3
Liquid Density at 25°C (77°F)							
kg/liter	1.29	1.55	1.28	1.46	1.35	1.56	1.23
lb/gal	10.8	12.9	10.7	12.15	11.26	13.06	10.26
Surface Tension at 25°C (77°F)							
N/m	0.0212	0.0162	0.019	0.0323	0.0259	0.1073	0.0193
dyn/cm	21.2	16.2	19.0	32.3	25.9	17.3	19.3
Viscosity at 25°C (77°F), cPs	0.59	0.59	0.45	0.54	0.49	0.47	0.43
Vapor Pressure at 25°C (77°F)							
kPa	51.7	38.5	46.6	9.9	20.3	44.5	76.9
atm	0.51	0.38	0.46	0.099	0.20	0.44	0.75
psia	7.5	5.6	6.8	1.4	2.9	6.46	11.15
Heat of Vaporization at boiling point							
kJ/kg	283	146	219	237.9	248.0	148	225
cal/g	67.1	35	52	56	58.8	35	53.2
Heat Capacity at 25°C (77°F)							
kJ/kg·°C	1.12	1.2	–	0.87	–	0.87	1.41
BTU/lb·°F	0.27	0.29	–	0.21	–	0.21	0.34
KB Value	95	31	52	129	125	37	56

NOVEC is a registered trademark of 3M

Safety/Flammability/Storage

Data from acute toxicity studies has demonstrated that Vertrel™ SDG has low toxicity. It has a calculated AEL(Acceptable Exposure Limit) of 193 ppm based on its individual components. AEL is an airborne inhalation exposure limit established by that specifies time-weighted average concentrations to which nearly all workers may be repeatedly exposed without adverse effects. The calculated AEL is in accordance with ACGIH formulas for TLVs for mixtures.Vertrel™ SDG is a slight skin and eye irritant and has low acute inhalation toxicity.

Please refer to the SDS for information on detailed exposure limits and toxicity-related data.

Vertrel™ SDG exhibits no closed cup or open cup flash point and is not classified as a flammable liquid by NFPA or DOT.The product is volatile, and if allowed to evaporate and mix with air, the vapor may become flammable. Flash point data and vapor flammability limits in air are shown in the table below.

Addition of alcohols such as methanol, ethanol or isopropanol to Vertrel™ SDG will increase the flammability of Vertrel™ SDG. Therefore, it is recommended that alcohol should not be mixed with Vertrel™ SDG.

Table 2
Flammable Properties

	Test Method	Vertrel™ SDG
Closed Cup Flash Point	ASTM D93	None
Open Cup Flash Point	ASTM D1310	None
Vapor Flammability in Air		
Lower Explosivity Limit	ASTM E681	7 vol% in air
Upper Explosivity Limit		14 vol% in air

Vertrel™ SDG is thermally stable and does not oxidize or degrade during storage. Store in a clean, dry area. Protect from freezing temperatures. If solvent is stored below –10 °C (14 °F), mix prior to use. Do not allow stored product to exceed 52 °C (125 °F) to prevent leakage or potential ruptureof container from pressure and expansion.

Disposal and Recovery of Spent Solvent

Please read SDS and discuss disposal options with a knowledgeable or distributor representative prior to disposal or recovery. The presence of high concentrations of certain soils (such as petroleum-based lubricating oils) may affect the flammability characteristics of the material during disposal and/or recovery operations. Users should test for flammability in their particular application and test the spent Vertrel™ SDG to ensure proper classification for waste disposal.

Material Compatibility

Vertrel™ SDG is compatible with metals. Plastics that may show signs of softening, swelling or other changes include acrylics, ABS and polycarbonate. Elastomers, if affected, will generally revert to within a few percent of original size after air-drying. Prior-to-use, testing of plastics and elastomers should be performed under conditions expected during normal operation (e.g., time in contact with Vertrel™ SDG,temperature, etc.). For more information on material compatibility,contact a Vertrel™ distributor. Contact with highly basic materials, pH 10 and above, is not recommended.

Product Description

Vertrel™ SDG Composition (Typical)

Hydrofluorocarbon mixture	17 – 20 wt%
1,2-trans-Dichloroethylene	80 – 83 wt%
Water	< 200 ppm
Non-volatile residue	< 10 ppm (drums) or < 50 ppm (pails)
Appearance	Clear, colorless