

# VERTREL® SION™

## CLEANING FLUID

### INTRODUCTION

Vertrel® Sion™ cleaning fluid is designed to meet the high solvency needs in the industrial cleaning market. Vertrel® Sion™ cleaning fluid is a safe, nonflammable, and environmentally friendly solvent with no ozone depletion potential (ODP) and a low global warming potential (GWP) (<15), which are all highly desirable in industrial cleaning applications like vapor degreasing.

Vertrel® Sion™ cleaning fluid is a blend of proprietary fluids and trans-1, 2-dichloroethylene (t-DCE) with azeotrope-like properties. Its exceptional solvency power (KB value = 103) makes it an ideal candidate for replacement of trichloroethylene (TCE), n-propyl bromide (nPB), benzene, perchloroethylene, methylene chloride, and other strong solvency fluids, where maximum cleaning power is a requirement. Vertrel® Sion™ cleaning fluid is also a great replacement option for solvents with low to mid-solvency power, such as HCFC-225, HCFC-141b, HFEs, PFCs, CFCs, and aqueous cleaners.

Vertrel® Sion™ cleaning fluid has the ability to clean a wide range of contaminants. The fluid features high solvency and low surface tension, which can improve the efficiency of a vapor degreaser. Vertrel® Sion™ cleaning fluid is easy to use and provides reliability with hassle-free maintenance.

### FEATURES AND BENEFITS

- Superior cleaning performance with best solvency power in its class (KB value = 103)

- Fast drying with an optimum boiling point (47 °C [117 °F]), allows cleaned parts to be processed and used immediately
- High soil loading capacity boosts productivity by reducing equipment downtime associated with solvent change-outs
- Product maintains compositional stability during use (azeotropic-like mixture)
- Maintenance free: No stabilizer maintenance required, easy to maintain and use
- In general, existing vapor degreasing equipment can be used with minor or no modifications. See DuPont Retrofit Guidelines
- No surfactants needed: Removes extra washing steps to achieve residue-free cleaning
- Recyclable and reusable: Reduces cost of ownership and environmental footprint
- Nonflammable
- Low odor and toxicity
- Excellent environmental profile: Low GWP (<15), no ODP

### TYPICAL APPLICATIONS

- Oil and grease removal
- Precision cleaning
- High solvency defluxing
- Silicone removal
- Vapor degreasing
- Cold cleaning

**Table 1. Physical Properties**

Property	Units	Vertrel® Sion™ Cleaning Fluid	CFC-113	HCFC-141b	Novec® 72DE	HCFC-225 ca/cb	TCE	Perc	nPB
Boiling Point	°C	47	48	32	43	54	87	121	71
	°F	117	118	90	109	129	188	250	160
Liquid Density <sup>(1)</sup>	g/cm <sup>3</sup>	1.29	1.56	1.23	1.28	1.55	1.46	1.62	1.35
	lb/gal	10.7	13	10.3	10.7	12.9	12.1	13.5	11.3
Saturated Vapor Density <sup>(1)</sup>	kg/m <sup>3</sup>	1.81	3.47	3.83	N.D. <sup>(2)</sup>	N.D. <sup>(2)</sup>	4.5	5.7	4.24
	lb/ft <sup>3</sup>	0.11	0.21	0.23			0.27	0.35	0.26
Surface Tension <sup>(1)</sup>	Dyn/cm	21	17.3	19.3	19	16.2	29.5	29.5	25.9
Vapor Pressure <sup>(1)</sup>	kPa	44.7	44.1	79.5	46.7	38.7	8.0	2.4	20.0
	psia	6.5	6.4	11.5	6.8	5.6	1.2	0.35	2.9
Viscosity <sup>(1)</sup>	cP	0.42	0.68	0.43	0.45	0.59	0.49	0.75	0.49
Liquid Thermal Conductivity <sup>(1)</sup>	mW/m-K	128	72.3	90.6	N.D.(2)	N.D.(2)	115.9	N.D.(2)	N.D.(2)
Heat Capacity <sup>(1)</sup>	kJ/kg °C	1.069	1.079	1.0996	N.D. <sup>(2)</sup>	1.046	0.962	0.855	1.103
	BTU/lb °F	0.26	0.26	0.27		0.25	0.23	0.21	0.27
Heat of Vaporization at Boiling Point	kJ/kg	280	147	223	218	145	236	210	246
KB Value		103	31	56	52	31	129	90	125

All data compiled was furnished from publicly available sources. <sup>(1)</sup> Values reported are at 25 °C (77 °F), unless otherwise specified, <sup>(2)</sup> N.D. refers to no reference data available

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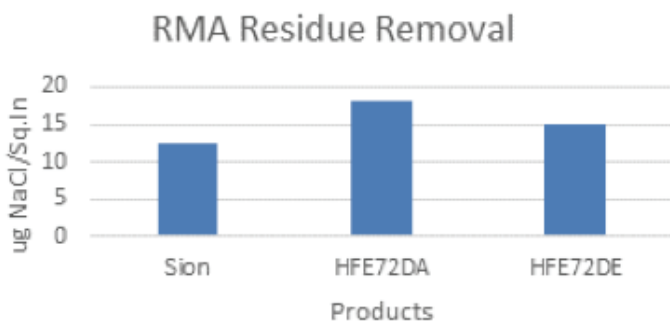
## PERFORMANCE EVALUATIONS

Vertrel® Sion™ cleaning fluid was evaluated for performance using typical coupon cleaning tests according to ASTM D122/123. Below are examples of the results from performance evaluations. Contact DuPont to initiate a cleaning trial in one of our regional cleaning laboratories or obtain a sample for on-site testing.

**Table 2. Performance Evaluations of Vertrel® Sion™ Cleaning Fluid**

	Contamination Level (mg/cm <sup>2</sup> )	% Contamination Removed (avg of 3 trials)
Mineral Oil	2	100%
Hydraulic Fluid (MIL-PRF-83282)	3.29	100%
Grease (MIL-PRF-81322)	16.27	100%

Vertrel® Sion™ cleaning fluid was evaluated for cleaning fluxes/residues and found effective in cleaning non-polar flux rosin residues from surface mounted technology printed circuit boards.



## SOLUBILITY

Vertrel® Sion™ cleaning fluid has the highest cleaning power of any cleaning fluid in its class as measured by the KB value (KB value = 103). The KB value is determined by ASTM D1133 and is a well-known measurement of solvency strength. In general, the higher the KB value, the greater the cleaning power. The solubility of Vertrel® Sion™ cleaning fluid for various contaminants is shown in Table 3.

**Table 3. Solubility of Various Contaminants in Vertrel® Sion™ Cleaning Fluid**

Contaminant	Solubility
Mineral	Miscible
Hydraulic Fluid (MIL-PRF-83282)	Miscible
Grease (MIL-PRF-81322)	Miscible
Silicone (DC-704)	Miscible
Skydrol®*	Miscible

\*Registered trademark of Eastman Chemical Company

For more information, please visit [www.vertrel.com](http://www.vertrel.com).

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## MATERIALS COMPATIBILITY

Vertrel® Sion™ cleaning fluid is compatible with most metals (i.e., copper, aluminum, steel), plastics (i.e., polyethylene, polypropylene, polyester, nylon), and elastomers (i.e., butyl rubber, polyurethane). See list of compatible and incompatible polymers/elastomers in Table 4. Consult a DuPont technical professional for specific material compatibility on your process.

**Table 4. Plastics/Elastomers Compatibility**

Plastics		Elastomers	
Compatible	Incompatible	Compatible	Incompatible
Polyethylene	Polystyrene	Butyl Rubber	Fluorosilicone
Polypropylene	Polycarbonate	Polyurethane	Hypalon®
Polyester	Polyacrylate	Parafluor	
PET	Acrylic (PMMA)	DuPont™ Kalrez®	
Acetal		Viton®	
Polyimide			
Teflon®			

## SAFETY, TOXICITY, AND ENVIRONMENTAL

Vertrel® Sion™ cleaning fluid exhibits no closed or open cup flash point and is classified as a nonflammable liquid by NFPA or DOT. The product is volatile; vapor may become flammable when mixed with air in the concentrations shown below. Flash point data and vapor flammability limits in air are shown in Table 5.

**Table 5. Safety, Toxicity and Environmental Properties**

Property	Units	Vertrel® Sion™ Cleaning Fluid
Flash Point, CC, ASTM D56	°C (°F)	None
Flash Point, OC, ASTM D1310	°C (°F)	None
Vapor Flammability Limits	% Vol	7.25–15.25
Ozone Depletion Potential	–	0
Global Warming Potential	–	<15
Volatile Organic Compounds (VOC)	g/l	1278
Occupational Exposure Limit	ppm	201

## STORAGE AND HANDLING

Vertrel® Sion™ cleaning fluid is thermally stable and does not oxidize or degrade during storage. It is recommended to store containers in a clean and dry area, and protect them from freezing and excessive temperatures of 52 °C (126 °F). When stored properly, an unopened package has no shelf life. Package sizes for Vertrel® Sion™ cleaning fluid are 20 kg (metal pail) and 227 kg (steel drum). Laminate film gloves are recommended when handling Vertrel® Sion™ cleaning fluid.