



FluoSolv[®] CX

Technical Information

Vapor-Degreasing Solvent

Introduction

FluoSolv[®] CX is a proprietary blend of non-flammable hydrofluoroethers (HFEs) and trans-1,2-dichloro-ethylene (t-DCE) engineered to maximize solvency.

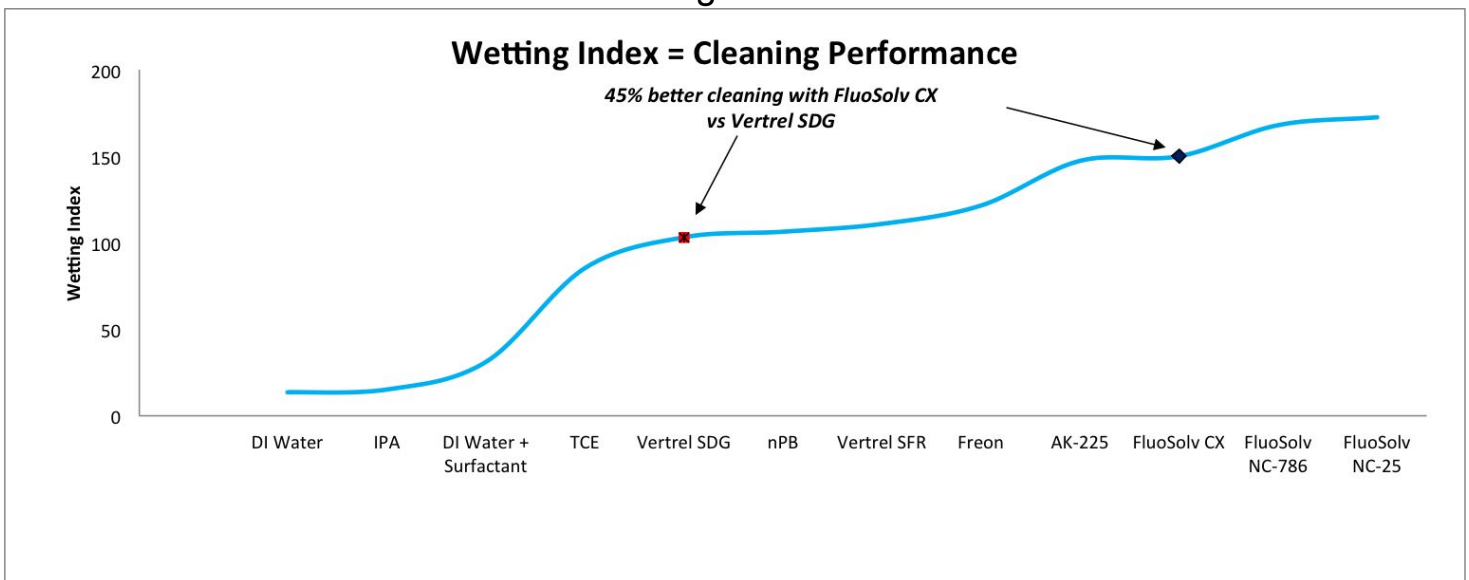
FluoSolv[®] CX is a drop-in replacement for trichloroethylene (TCE), n-propyl bromide (nPB) and Chemours Vertrel[™] SDG. It can also be used as a substitute for other cleaners such as Asahi AK-225 (blend of HCFC-225 ca/cb) & HCFC-141b both of which are ozone depleting substances and have been banned from production.

Moreover, vapor-degreasing with FluoSolv[®] CX is an economically feasible option for aqueous cleaners when environmental concerns and/or floor space are at a premium.

FluoSolv[®] Technology & Performance

FluoSolv[®] CX solvent blending technology leverages the chemical solvency of the fluid as well as its physical properties such as high density, low surface tension and low viscosity for optimal performance. Our research has shown that to clean metal surfaces in the shortest amount of time the solvent must flow extremely close to the surface to “catch & release” contaminants. “Wetting Index” is a tool that we have developed to engineer FluoSolv[®] CX by selectively blending hydro-fluoroethers and 1, 2 trans-dichloroethylene to create a high wetting index solvent. Field data has shown a strong correlation between high wetting index & cleaning performance. Fig 1. below shows solvent performance on a wetting index scale.

Figure 1



User Benefits

NuGenTec FluoSolv® CX is ideally balanced to deliver performance, worker safety and desirable environmental properties.

- Non-ozone depleting chemical (ODC)
- Drop-in replacement; no equipment modifications
- Low global warming potential (GWP)
- Low toxicity; high allowable exposure limit (AEL); no ceiling on instantaneous exposure
- Chemically stable; will not go acid
- High wetting index delivers superior cleaning performance

FluoSolv® CX properties are shown below in Table 1 along with that of commonly used vapor-degreasing solvents

Conformity Testing

NuGenTec FluoSolv® CX has been tested extensively 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)

Physical Properties

Table 1

| Property | NuGenTec FluoSolv® CX | Asahi AK-225 | Chemours Vertrel® SDG | Honeywell Solstice® | TCE | nPB |
|--|-----------------------|--------------|-----------------------|---------------------|--------------|--------------|
| Boiling Point °C [°F] | 41- 43 [106 -110] | 54 [129] | 43 [109] | 19 [66] | 87[189] | 71[160] |
| Density at 25°C (77°F) kg/liter [lb/gal] | 1.29 [10.8] | 1.55 [12.9] | 1.28 [10.7] | 1.27 [10.6] | 1.46 [12.15] | 1.35 [11.26] |
| Surface Tension at 25°C (77°F) dyne/cm | 19.1 | 16.2 | 21.2 | 12.7 | 32.3 | 25.9 |
| Viscosity at 25°C (77°F), cPs | 0.45 | 0.59 | 0.59 | 0.53 | 0.54 | 0.49 |
| Vapor Pressure at 25°C (77°F) kPa | 50.9 | 38.5 | 51.7 | 152 | 9.9 | 20.3 |
| Heat of Vaporization @bp cal/g | 65.3 | 35 | 67.3 | 45.6 | 56 | 58.8 |
| Global Warming Potential | <30 | 370 | 148 | 1 | n/a | n/a |
| Ozone Depleting Chemical | No | Yes | No | No | No | No |
| Volatile Organic Compounds (VOC) g/l | 1,035 | 0 | 1,150 | 0 | 1,470 | 1,350 |
| Allowable Exposure Limit (AEL) ppm | 335 | 100 | 200 | 800 | 10 | <10 |
| Worker Exposure Ceiling (ppm) | No | No | 400 ^a | No | 30 | 10 |
| KB Value | 95 | 31 | 95 | 25 | 120 | 125 |

VERTREL is a registered trademark of The Chemours Company

a: Has a ceiling of 400 ppm due to its acute toxicity. None of the above solvents have any stipulated ceiling on AEL



Worker Safety

Data from acute toxicity studies of various ingredients has demonstrated that FluoSolv® CX has low toxicity. It has a calculated AEL (Acceptable Exposure Limit) of 335 ppm based on its individual components. AEL is an airborne inhalation exposure limit that specifies time-weighted average concentrations to which nearly all workers may be repeatedly exposed without adverse effects. The AEL is calculated in accordance with ACGIH formulas for TLVs for mixtures.

None of the ingredients in FluoSolv® CX have any chronic or acute toxicity associated with them which makes it a worker friendly solvent. See Table 1 for comparative data on other available solvent options.

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

NuGenTec FluoSolv® CX exhibits no closed cup or open cup flash point and is not classified as a flammable liquid per established definitions by NFPA or DOT, however being volatile, vapors may become flammable in air. Flash point data and vapor flammability limits in air are shown in Table 2.

Flammability

| | Table 2 Test Method | FluoSolv™ CX |
|---------------------------|------------------------|--------------|
| Closed Cup Flash Point | ASTM D93 | None |
| Open Cup Flash Point | ASTM D1310 | None |
| Vapor Flammability in Air | ASTM E681 | |
| Lower Explosivity | | 9.7 vol% |
| Upper Explosivity | | 12.8 vol% |

Storage

FluoSolv® CX is thermally & chemically a very stable solvent. It is non-reactive, has very low affinity for water and will not oxidize or degrade when exposed to air. It is not affected by any sunlight or other sources of UV radiation. Common industrial practice should be implemented for storage such as away from human food source and extreme temperature conditions. Freezing temperatures will cause the drums to compress and hot conditions will balloon the drum. The product in any case is perfectly usable.

Solvent Recycling

FluoSolv® CX exhibits excellent chemical stability allowing it to be very easily reclaimed and reused by a simple recycling process. Commercially available modular recycling units can easily be added to realize sizable savings in solvent usage. Solvent recovery yields are typically in the range of 80 to 95%.

Please contact the FluoSolv® Technical Services group for information.

Material Compatibility

FluoSolv® CX is compatible with all metals, ceramic and other non-conducting materials. Most elastomeric materials are compatible except fluoroelastomers such as Viton & Kalrez which tend to swell. It is recommended that all materials be tested prior to use. For more information on material compatibility, contact FluoSolv technical services.

| | Compatible | Additional Testing Required |
|------------|---|-----------------------------|
| Metals | Aluminum, Copper, S/S Titanium, Brass, Tungsten | - |
| Elastomers | Neoprene, Butyl Rubber | Viton, Kalrez |
| Plastics | HDPE, PTFE, Nylon, PVC Epoxy, Phenolic | Acrylic, ABS |

Packaging & Availability

FluoSolv® CX is available commercially in 3 sizes:

- 55-gal lined metal drums (net wt. 550 lb.)
 - 5-gal lined pails (net wt. 52.5 lb.)
 - 1 gal amber glass bottles (net wt. 11 lb.)
- Note: Drum & Pail have phenolic liner*

All package sizes are inventoried at Emeryville, CA & Ohio. Lead times are 1-3 business days after receipt of order.

Exclusively Sold by NuGenTec.