

F-SOLVENTS

As part of the accelerated EU phase-out of HCFC solvents use under European Regulation EC 2037(2000) the precision cleaning market is changing, with “not-in-kind” technologies taking over the main market share. “In-kind” solvents such like HFEs & HFCs are expected to reach a level of no more than 15% of the previous volume of HCFC solvents. This value of 15% was a typical conversion factor during the previous change of fluorine containing solvent from CFC-113 to HCFC-141b and the reduction comes from continuing technical advances in equipment.

The new generation solvents (mainly hydrofluoroethers, such as HFE-449s1 and hydrofluorocarbons, such as HFC-4310mee) have been developed over the last years and started to replace HCFC-141b since 1997. They are selected when the following topics play a key role: water-free processes, non-flammability, good material compatibility, low process temperature, critical parts’ geometry and environmental considerations (no ODP, low GHG emissions).

Comparing the expected market development of CFC-113 (originally used) versus HCFC-141b and then the new “F-solvents” (HFEs or HFCs) the following European scenario can be drawn up. The development of this change will be supported by the EC VOC directive (1999/13/EC).

Solvent	ODP	GWP	Atmospheric Lifetime (years)	Volume tonnes/yr	GWP x vol. Gg CO₂ equivalent	Impact vs reference
CFC-113	0.8	5000	85	50000	250	100 (ref)
HCFC-141b	0.11	630	9.2	6000	3.78	1.5
HFE-449s1/ HFC-43-10mee	0.00	300 / 1300	4.1 / 17.1	800	0.24 / 1.04	0.5

The new “F-solvents” are specifically designed for precision cleaning and drying requirements. In combination with new or retrofitted equipment, these solvents result in significantly reduced emission levels. This trend is mainly driven by favourable vapour pressure, viscosity and surface tension, designed to limit drag-out and diffusive losses, as well as technical improvements. The new generation solvents discussed here will result in significantly reduced GWP emissions under conditions of use.

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