

PROMOSOLV™ 71DS1

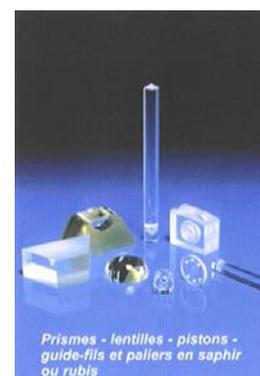


FEATURES

Water removal at the final step of production, is one of the most important step in the manufacturing of mechanical assemblies, plastic and electronic parts.

The **spot free drying** product **PROMOSOLV™ 71DS1** has been specially developed **to dry parts without leaving any residue, while respecting the environment and the energy saving issue.**

PROMOSOLV™ 71DS1 is a proprietary formulation composed of hydrofluoroether NOVEC™ 3M™ HFE-7100 and a drying additive, no ODP, non flammable, and a very low toxicity. Its typical physical properties are compared to other drying products.



SPECIFICATIONS

| Caractéristiques | Unités | Valeurs | Méthodes |
|-----------------------|--------------------|------------|----------|
| Appearance | - | Colourless | Visual |
| Density (at 20°C) | kg/cm ³ | 1,52 | - |
| Purity | % | 99,8 | - |
| Non volatile residues | ppm | ≤ 2,0 | - |
| Additive content | ppm weight | 4000 ± 400 | MO 0535 |

CHARACTERISTICS

| Properties | Units | Promosolv DS1 | CFC-113 | HCFC-141b | Trichlor-EthylEne | Methylene Chloride |
|---------------------------------------|-------------------|---------------|----------|-------------|-------------------|--------------------|
| Boiling point | °C | 60 | 48 | 32 | 87 | 39.8 |
| Freezing point | °C | - 135 | - 35 | - 103 | - 86 | - 96.7 |
| Flash point | | none | none | none | none | none |
| Density | g/cm ³ | 1.52 | 1.56 | 1.23 | 1.46 | 1.32 |
| Surface tension | mN/m | 13.6 | 17.3 | 19.3 | 22 | 25.5 |
| Inflammable limits % volume | LII LSI | - - | - - | 5.6 17.7 | - - | 15.5 66.4 |
| Solubility of the solvent in water | ppm | < 15 | 110 | 2700 | 1100 | 19000 |
| Additive concentration | ppm | 600-5000 | 600-3000 | 600-3500 | 500-3000 | 500-4000 |
| Heat transfer | | | | | | |
| Vapour pressure | kPa | 28 | 44.1 | 75.9 | 10 | 73.6 |
| Dynamic viscosity | mPa.s | 0.61 | 0.68 | 0.43 | 0.62 | 0.425 |
| Latent heat of vaporization | kJ/kg@bp | 125 | 146 | 223 | 265 | 391 |
| Specific heat | kJ/kg.K | 1.17 | 0.92 | 1.26 | 0.93 | 1.3 |

PACKAGING TYPE

Packaging types of 34 kg and drums of 245 kg available.

STORAGE & SHELF LIFE

PROMOSOLV™ 71DS1 is not flammable in the standard conditions of use or storage. This fluid is highly stable to thermal and chemical reaction when used or stored in normal conditions. Some more procedures are detailed into the safety data sheet available on request. This product does not sustain combustion according to the norm : ASTM D4206-86 (< 1 second).

To ensure the best product performance it is recommended to store the products in closed packaging types. Shelf life: 18 months under these conditions.

PROCESS PARAMETERS

Material compatibility

As with the most fluorinated liquids, PROMOSOLV™ 71DS and NOVEC™ 3M™ HFE-7100 are absorbed by the plastics and the fluorinated elastomers in case of a prolonged exposure. A simple test along the process is recommended with all materials.

| Metals | Plastics | Elastomers |
|-----------------|---------------|----------------|
| Aluminium | Acrylic | Butyl rubber* |
| Copper | Polyethylene | Natural rubber |
| Carbon steel | Polypropylene | Nitril rubber |
| Stainless steel | Polycarbonate | EPDM |
| Brass | Polyester | |
| Molybdenum | Epoxy | |
| Tantalum | PET | |
| Tungsten | ABS | |
| German silver | PMMA | |
| Aloy Cu/Be C172 | C-PVC | |
| Alloy Mg AZ32B | | |

Tested compatibility for an exposure of 1 hour at boiling temperature.

* Butyl rubber is preferable for a prolonged exposure > 1 month.

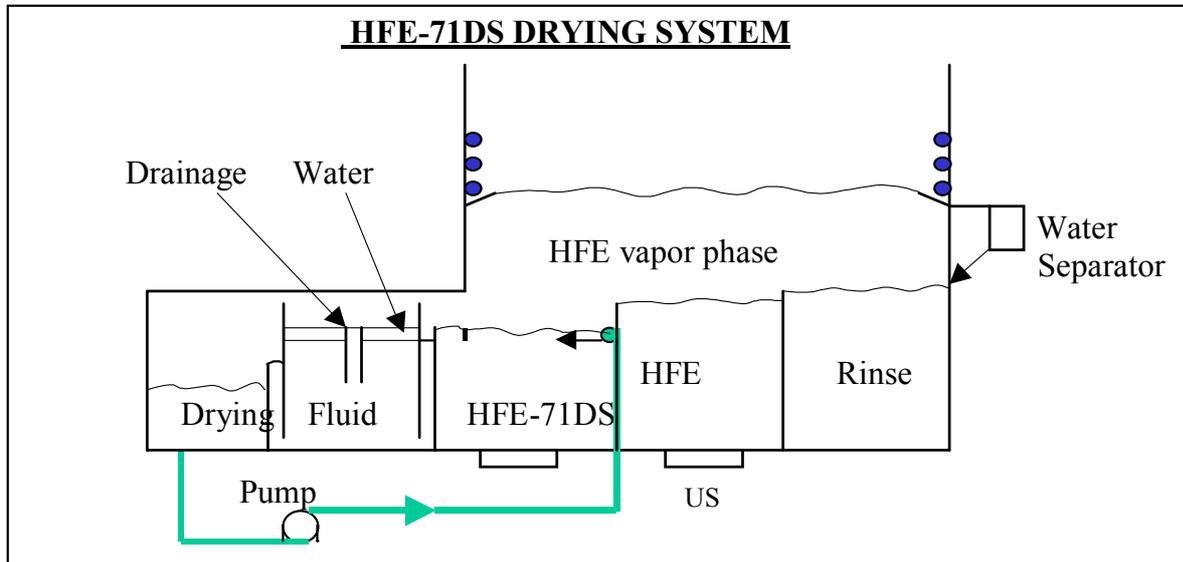
Exceptions: swelling of PTFE and silicon rubber

The compatibility tests of **PROMOSOLV™ 71DS1** show a good compatibility with a large range of metals, plastics and elastomers, similar to the performance of perfluorinated liquids.

A good compatibility with plastics particularly sensible as the polycarbonate and the PMMA indicate a possible use in the cleaning unit containing numerous components.

PROMOSOLV™ 71DS1 and the spot free drying process.

The spot free drying process with PROMOSOLV™ 71DS1 works according to the principle of the water displacement. When wet parts are immersed into the **PROMOSOLV™ 71DS1** fluid which has a heavier density and much lower surface tension, water is removed of the parts by gravity to the surface of the fluid. This process needs a two to three sump drying unit. This type of drying allows heavy production for all type of materials.



The water introduced into the **PROMOSOLV™ 71DS1**, which contains a very carefully selected additive, is displaced by gravity towards the surface of the sump on which a flushing ramp pushes it over a weir, into a gravity water separator. This decanted water is rejected from the dryer through the water drain while the **PROMOSOLV™ 71DS1** fluid is re-circulated to the first drying sump with a pump. Dried parts are then rinsed in the second and third sumps of Novec™ 3M™ HFE-7100. The final rinse is made in the vapour phase, and then the spot free parts can be very gently removed from the drying unit.

Applications PROMOSOLV™ 71DS1

PROMOSOLV™ 71DS1 drying agent has been specially developed for the spot free drying application for plastic, metal, optic, ceramic parts and assemblies.

- Watch industry
- Jewel industry
- Medical
- General and precision mechanic
- Aircraft industry
- Military
- Others

This drying process with **PROMOSOLV™ 71DS1** drying agent replaces the CFCs, HCFCs or the Chlorinated drying systems, provides entire satisfaction for heavy duties applications and complies with regulations.

Advantages

PROMOSOLV™ 71DS1 drying agent provides many advantages compared to conventional drying systems :

- Removal of small and large quantities of water.
- Spot free drying versus hot air.
- Parts are not damaged like it can happen for the centrifugation.
- No dust contaminates parts as for absorbing material.
- Removal of water with a pH included between 5 and 9.
- Drying of tap water and DI water.
- Low energy consumption.
- Reduces of cycle time by elimination of air drying step.
- Solubility of HFE-71DS1 drying agent in water is very low and thus respects the environment.

Typical drying process

Recommendations to dry with **PROMOSOLV™ 71DS1** drying agent

1. Introduce the parts to dry in a basket with the lowest water retention as possible and deep the basket in the drying sump with the **PROMOSOLV™ 71DS1** drying agent. The drying time depends on the profile of the parts, the cycle time can vary between 30 secondes and 3minutes. Vertical agitation can help to dislodge any trapped water between parts.
2. Remove the basket from the first sump and wait that the excess of drying agent drains back. Transfer the basket into the second rinse for the first rinsing operation into NOVEC™ 3M™ HFE-7100. The cycle time can vary between 30 seconds and 3 minutes. Vertical agitations or ultrasonics can help to better rinse.
3. Transfer the basket to the third rinse and proceed as point 2 and then use the NOVEC™ 3M™ HFE-7100 vapour phase for 1 minute until the temperature of the parts is equal to the temperature of the vapour.
4. Move the basket from the vapour phase to the cold zone for 1 minute to dry the parts and so that no HFE is carried out of the dryer.

Equipment

The experience has shown that retrofitted or new equipment is the best choice to use **PROMOSOLV™ 71DS1** and NOVEC™ 3M™ HFE-7100 agent to provide high quality and a very economical solution.

HSE

| Properties | Units | Promosolv DS1 | CFC-113 | HCFC-141b | Trichlor-ethylene | Methylene Chloride |
|---------------------------|-------|---------------|---------|-----------|-------------------|--------------------|
| Environmental data | | | | | | |
| Ozone depletion pot. | ODP | 0.00 | 0.80 | 0.10 | < 0.005 | < 0.005 |
| Global warming pot. | GWP | 500 | 5000 | 630 | < 10 | < 100 |
| Atmospheric lifetime | years | 4.1 | 85 | 9.4 | 8 | 0.5 |
| Toxicity | | | | | | |
| Exposure average: 8h | ppm | 750 | 500 | 500 | 25 | 50 |
| VOC | | YES | YES | YES | YES | YES |

- R phrases :** **R 53** : May cause long-term adverse effects in the aquatic environment
- S phrases :** **S 21** : When using do not smoke
- S 51** : Use only in well-ventilated areas
- S 57** : Use appropriate container to avoid environmental contamination
- S 61** : Avoid release to the environment. Refer to special instructions/safety data sheet

INVENTEC provide a recycling program for the used products. A technical information sheet describes the procedure « Eco-Program » which establishes a full report of the returned fluid, where and how this fluid was used and which specifies information, it is not been contaminated with some other substances. This necessary document shall be provided to you.

Please read carefully the safety data sheet of the product **PROMOSOLV™ 71DS1** before use. All safety measures should be taken. In all kind of handling or exposition to the product, the individual protection recommended by the safety data sheet should be taken. The typical figures used here above can be changed without notice.

The information contained in this product sheet is given for indicative purposes and in no way incurs the liability of INVENTEC. All users are liable, with respect to Administrative Authorities (regulation of facilities classified for the protection of the environment) for the compliance of their installation.

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