

Galden PFPE Vapor Phase Fluids

Product Data Sheet

During Vapor Phase Heating (VPH), parts are directly immersed in a heated vapor blanket. The saturated vapor condenses and transfers its latent heat of vaporization to the surface of the parts. VPH, also called condensation heating, is therefore a very versatile method of heat transfer.

Galden perfluoropolyether (PFPE) fluids are available with boiling points from 165°C to 265°C and are adaptable for applications such as:

- Polymer Thick Films
- Solder Mask
- Conductive Inks
- Adhesives
- Coatings

Benefits of Vapor Phase

Vapor phase soldering provides an innovative method for SMT, which the following will illustrate:

At atmospheric pressure the temperature of the vapor will be the same as that of the boiling liquid.

Fluctuations in temperature are much less than if infra red or laser heat is used because even if power is increased, the rate of vapor production will increase but the temperature remains the same.

Galden PFPE primary VPS fluids are available in a wide temperature range, for example from LS/155 to HS/260 (155°C and 260°C boiling points respectively).

The vapor density of Galden PFPE fluids is much higher than that of air and therefore soldering takes place in an inert atmosphere, thereby removing the added cost incurred from the use of inert gases such as nitrogen.

The process is extremely fast and efficient since the heat transfer coefficient of vapor condensation is

about ten times (10x) faster than hot air and about eight times (8x) faster than infra red heat.

VPR is independent of size, shape or geometry with the maximum surface area exposed and every component part seeing precisely the same temperature.

The process is clean as the components only come in contact with distilled vapors. Furthermore, the inertness of Galden fluid does not present a compatibility problem with these components. Also because of their low heat of vaporization, Galden fluids evaporate quickly from the hot surface resulting in rapid, residue free drying of the parts.

Galden fluids exhibit high chemical and thermal stability and are safe to use up to 290°C.

Selection of Primary Fluids

With the increasing use of vapor phase soldering in production environments, greater emphasis is being placed on the nature of the primary fluid selected with respect to safety, consumption, cost-effectiveness, temperature selection and stability, and system compatibility. These parameters are to some extent linked to the type and choice of vapor phase machine but are mainly governed by the physical properties of the selected fluids.

The specific properties of Galden fluids make them particularly suitable for use in vapor phase heating applications. Relevant properties are presented in more detail on the following pages.

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Typical Properties

Typical Property	Units	LS/155	LS/165	LS/200	LS/210	LS/215	LS/230	HS/240	HS/260
Boiling Point	°C	155	165	200	210	215	230	240	260
Density, 25°C	g/cm ³	1.76	1.77	1.79	1.80	1.80	1.82	1.82	1.83
Kinematic Viscosity, 25°C	cSt	1.40	1.60	2.50	2.90	3.80	4.40	5.30	7.00
Vapor Pressure, 25°C	Torr	<1	<1	<1	<10 ⁻¹	<10 ⁻¹	<10 ⁻²	<10 ⁻²	<10 ⁻²
Heat of Vaporization @ Boiling Point	cal/g	17	15	15	15	15	15	15	15
Surface Tension 25°C	dynes/cm	18	18	19	20	20	20	20	20
Average Molecular Weight	a.m.u.	700	740	870	920	950	1020	1085	1210

Galden SVP

Secondary Blanket grades

Galden SVP is recommended as the secondary fluid in dual fluid vapor phase soldering systems. SVP does not contain chlorine or bromine and therefore will not deplete the ozone layer. Galden SVP is an extremely stable, non-toxic fluid.

Efficient Primary Fluid Blanket

SVP has been proven in our laboratory and at customer sites as an efficient secondary fluid. The fluid blankets and retains the condensation vapor

of the Galden primary fluids with no significant change in the temperature profile.

Advantages of SVP Grades

The different chemical structure of SVP compared to other fluorocarbon fluids assures the following:

- Lower flux solubility
- Higher thermal stability
- Less equipment corrosion
- Lower losses
- Zero Ozone Depletion Potential

Typical Property

SVP

SVP-3

Vapor Temp (TRV)	70°C	52°C
Boiling Point (TRL)	90°C	54°C
Density, 20°C, (g/ml)	1.7	1.8
Viscosity, 20°C (cSt)	0.81	0.65

Galden®