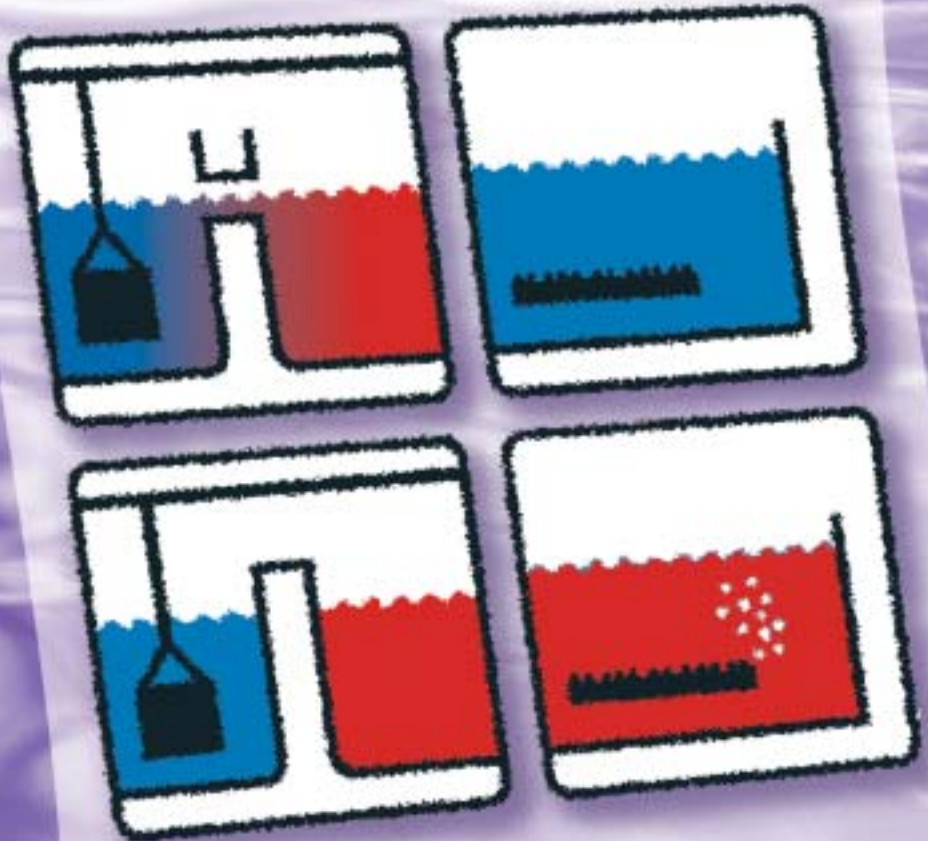


GALDEN[®] testing

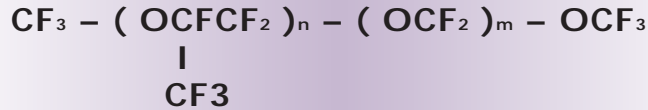


Electronic Fluids

Solvay
Solexis



GALDEN® Electronic Fluids



GALDEN® Electronic Fluids is a line of dielectric fluids with boiling points ranging from 55°C to 270°C. Their excellent dielectric properties, high chemical and thermal stability combined with their capacity to operate at very low as well as elevated temperatures make them ideal for Electronic Quality Testing.

FEATURES

- High boiling point with low pour point and low viscosity
- Low evaporation rate
- Good heat transfer performance

- High dielectric strength
- Excellent electrical resistivity (a billion times higher than DI-Water)
- No change in dielectric properties with use

- Excellent thermal and chemical stability
- Good compatibility with materials

- No flash or fire points
- No Auto Ignition Point
- No Explosion hazards

BENEFITS

- Wide choice of grades to optimize performance
- Low consumption
- Low environmental load
- Better temperature control

- No damage to sensitive electronics while immersed in the liquid
- No risk of short circuiting
- Better process control

- No corrosion or reaction with construction materials
- No formation of decomposition residues

- Enhanced safety
- Safe to use at high temperature

Fluids non-reactivity, excellent dielectric properties, non-toxicity, non flammability and non-solvent features make **GALDEN®** Electronic fluids suitable for electronic reliability testing including thermal shock and hermetic seal testing.

GALDEN® Electronic Fluids

Thermal Shock Testing

Typical Properties (Not for specification purpose)

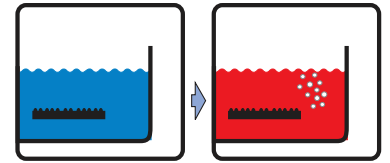
Property	Unit	SINGLE FLUIDS		DUAL FLUIDS	
		D02TS	D03	D02	D05
Normal Boiling Point	°C	165	203	175	230
Pour Point	°C	-97	-85	-97	-77
Density, 25°C	g/cm ³	1.77	1.79	1.77	1.82
Density, -54°C	g/cm ³	1.95	1.96	1.95	1.98
Kinematic Viscosity, 25°C	cSt	1.7	2.4	1.8	4.4
Kinematic Viscosity, -54°C	cSt	45	160	-	-
Specific Heat, 25°C	J/Kg°C	973	973	973	973
Thermal Conductivity, 25°C	W/m°C	0.07	0.07	0.07	0.07
Coefficient of Expansion	cm ³ /cm ³ °C	0.0011	0.0011	0.0011	0.0011
Surface Tension	dyne/cm	16	16	16	17
Dielectric Strength	kV (2.54 mm gap)	40	40	40	40
Dielectric Constant	-	2.1	2.1	2.1	2.1
Volume Resistivity	Ohm-cm	1x10 ¹⁵	1x10 ¹⁵	1x10 ¹⁵	1x10 ¹⁵
Average Molecular Weight	amu	750	870	760	1,020

Hermetic Seal Testing

Typical Properties (Not for specification purpose)

Property	Unit	DETECTOR FLUIDS		INDICATOR FLUIDS	
		DET	D02	D03	D05
Normal Boiling Point	°C	81	175	203	230
Pour Point	°C	-110	-97	-85	-77
Density, 25°C	g/cm ³	1.70	1.77	1.79	1.82
Density, 125°C	g/cm ³	-	1.54	1.58	1.62
Kinematic Viscosity, 25°C	cSt	0.60	1.80	2.40	4.4
Kinematic Viscosity, 125°C	cSt	-	0.46	0.55	0.65
Specific Heat, 25°C	J/Kg°C	973	973	973	973
Thermal Conductivity, 25°C	W/m°C	0.07	0.07	0.07	0.07
Coefficient of Expansion	cm ³ /cm ³ °C	0.0011	0.0011	0.0011	0.0011
Surface Tension	dyne/cm	16	16	16	17
Dielectric Strength	kV (2.54 mm gap)	40	40	40	40
Dielectric Constant	-	2.1	2.1	2.1	2.1
Volume Resistivity	Ohm-cm	1x10 ¹⁵	1x10 ¹⁵	1x10 ¹⁵	1x10 ¹⁵
Average Molecular Weight	amu	430	760	870	1,020

GALDEN® Hermetic Seal Testing



HERMETIC SEAL: THE TEST

Electronic devices must be completely sealed to avoid penetration by moisture and potential damage of the electrical response of the silicon chip.

To guarantee the hermeticity of devices, a leak test procedure has been defined and ruled by MIL STD 883, MIL STD 750 and MIL STD 202.

GALDEN® fluids being extremely inert and residue free are ideal and widely used as detector and indicator fluids in leak test procedures.

GALDEN® Fluids for Gross Leak Test conforming to MIL STD

Fluid Type	Type I Detector	Type II Indicator	Type III Detector
Test Condition	C1, C3	C1	E
Galden Fluids	DET	D02	DET

GALDEN® DET: detector fluid specifically designed for high reliability measures **GALDEN® DET**, Type I and III detector fluid, offers higher reliability with respect to traditionally used fluids.

GALDEN® DET, thanks to its perfect balance between low and high boilers components, can easily detect large and small leaks:

- High boilers enter through large leaks and remain liquid until the test is performed.
- Low boilers can easily penetrate into small leaks

GALDEN® D02 and D03: Low Consumption Indicator Fluids

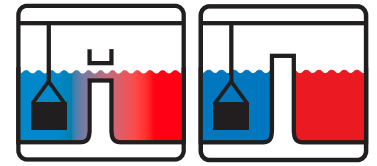
GALDEN® D02 and **D03** can be advantageously used as Indicator fluids respectively in Military and Non Military applications.

- Higher boiling point
- Lower vapor pressure at test temperature

WILL RESULT IN...

- Reduced evaporative loss
- Lower consumption compared to other commercially available indicator fluids.





GALDEN® Thermal Shock Testing

THERMAL SHOCK: THE TEST

Thermal Shock testing is performed to check the resistance of electronic devices to extreme changes of temperature. The test is carried out by alternately dipping the devices in liquids maintained at two different temperatures.

For military applications thermal shock test has to be performed as specified in MIL STD 883 method 1011 or MIL STD 202 method 107.

DUAL FLUID OR SINGLE FLUID?

Dual Fluid System

Traditionally two different fluids can be used in the hot and cold bath but, this practice presents the following disadvantages: High Fluid Loss from Cold Bath, Cross Contamination between Cold and Hot baths, Equipment Downtime and Dual Fluid Inventory.

Single Fluid System

GALDEN® fluids with their Single Fluid System is an advantageous alternative to the Dual Fluid Solution.

GALDEN® D02TS and **D03** are the single fluids which can successfully replace the need for a dual fluid system.

GALDEN® D02TS is the proposal for all the Military applications; it meets the MIL STD 883 and MIL STD 202 while for all Non-Military Applications **GALDEN® D03** can be used.

A Single Fluid for both baths allows for a dramatic decrease in operating costs by:

- Decreasing fluid consumption
- Reducing equipment downtime
- Eliminating cross contamination
- Reducing inventory to a single product

GALDEN® Fluids for Thermal Shock Testing Conforming to MIL STD 883

Test Condition	Hot Step (°C)	Cold Step (°C)	Hot Bath Fluid	Cold Bath Fluid
B	+125	-55	D02 D02TS	DET D02TS
C	+150	-65	D02 D02TS	DET D02TS
D	+200	-65	D05	DET
E	+150	-195	D02 D02TS	Liquid N2
F	+200	-195	D05	Liquid N2

Solvay Solexis is an international fluorospecialties producer and offers a wide range of fully and partially fluorinated polymers, supplying high performance materials to demanding industries. It is its unique understanding of fluorochemistry and a relentless commitment to improving its processes and products that differentiate the Solvay Solexis portfolio from alternative products. The Solvay Solexis treasure of intellectual property (more than 3000 patents) includes fluoropolymers (PTFE, ECTFE, PFA, MFA®, PVDF), fluorinated fluids (PFPE) and fluoroelastomers (FKM, FFKM) and cover a wide range of demanding markets, such as Aircraft & Aerospace, Automotive, Building & Construction, Consumer Goods, Electrical & Electronics, Healthcare, Oil & Gas, Packaging, Pharma & Chemical Processing, Plumbing, Pulp & Paper, Semiconductors, Water & Membrane, Wire & Cable.

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Europe

Solvay Solexis S.p.A.
Italy, Tel: +39 02 3835 1

North America

Solvay Solexis Inc.
US, Tel: +1 856 853 8119

Asia

Solvay Shanghai Co. Ltd.
China, Tel: +86 21 5080 5080

solexis.marketing@solvay.com
www.solvayplastics.com
www.solvay.com



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