Solvay Solexis

Fomblin Z Derivatives

Product Data Sheet

Fomblin®

Lubricants for the Information Age

The most advanced, highest recording densities and lowest cost method of storing digital information involves writing and reading magnetic flux patterns from rotating disks coated with magnetic materials. This technique was invented in the late 1950's by IBM and the basic method, now refined and improved, remains the same.

A magnetic layer, where information is stored in the form of bits, is sputtered onto a metallic support structure. Next an overcoat, usually made of amorphous hydrogenated carbon, is placed on top of the magnetic layer for protection and finally a lubricant is applied to the overcoat. A read-write head flies above the lubricant and information is exchanged between the head and the magnetic layer. In a relentless attempt to increase the efficiency of information transfer, hard drive manufacturers have reduced the distance between the head and the magnetic layer, or fly-height, to the point where it is now below 500Å.

While texturing of the support layer, the magnetic layer and overcoat is quite remarkable, invariably, during normal disk drive application, the head and the disk surface will make contact. To reduce wear on the disk, from both sliding and flying contacts, it must be lubricated.

Fomblin Z-derivatives are widely used as lubricants in the magnetic disk drive industry to decrease the friction between the head and disk, that is, reduce wear and therefore minimize possibility of disk failure. Z-Derivatives are well suited for this application because of their:

- *Chemical and Thermal Stability - limited decomposition*
- *Low Surface Tension - good coating, high spreading*
- *Low Vapor Pressure - low out-gassing*
- *Good viscosity index - low change in viscosity over wide temperature range*
- *Good re-flow properties - self coating*
- *Adhesion to substrate via organofunctional bonds*
- *Excellent Lubricity - reduce disk wear*

NOTE: These specialized Fomblin grades have controlled molecular weight distribution to provide low evaporative losses, a feature which is required for this application. Solvay Solexis continues its leadership role as the main supplier of lubricants to hard disk manufacturers. In addition to established products, such as Fomblin Z-DOL and Fomblin AM-2001, new functional groups are in development.

MRM Lubricant

All the lubricants for this application are based on a linear perfluoropolyether backbone end capped with two functional groups specifically designed to have a strong interaction with the disk surface, thus enabling the molecule to stay flat with a good adhesion on the surface.

These unique structures provide a better tribological behavior, an exceptional surface lubricity coupled with better stability of the lubricant layer compared with other non-functional products even when used in a nearly monomolecular layer.

Chemical Structure:

$X\text{-}CF_2\text{-}O\text{-}(CF_2\text{-}CF_2\text{-}O)_p\text{-}(CF_2O)_q\text{-}CF_2\text{-}X$

Details of the structure and the properties for the specific grades are listed in the following tables.

For information contact your Solvay Solexis representative or:

Europe
Solvay Solexis S.p.A. (Italy)
Tel: +39-02-3835-1
Fax: +39-02-3835-2129
Email: solvaysolexis.ita@solvay.com

North America
Solvay Solexis, Inc.
Tel: +1-856-853-8119
Fax: +1-856-853-6405
Email: solvaysolexisinfo@solvay.com

Solvay Solexis

SOLVAY

Fomblin Z Derivatives

Product Data Sheet

Grade	*X group*
FOMBLIN Z DOL 2000,2500,4000	$-CH_2OH$
FOMBLIN Z DOL TX	$-CH_2(O-CH_2-CH_2)_pOH$
FOMBLIN Z TETRAOL	$-CH_2OCH_2CH(OH)CH_2OH$
FOMBLIN AM 2001, AM 3001	$-CH_2O-CH_2$ – pyperonyl

Fomblin Z-DOL Grades

Properties	Units	Z DOL 2000	Z DOL 2500	Z DOL 4000
Functional group	—	Alcohol	Alcohol	Alcohol
Appearance	visual	Clear liquid	Clear liquid	Clear liquid
Color	APHA	Colorless	Colorless	Colorless
MW (NMR)	amu	2000	2500	4000
Difunctional content (NMR)	%	94	96	90
C2/C1 ratio (NMR)	—	1	1	1
Kinematic viscosity	cSt	85	76	100
Density @ 20°C	g/ml	1.81	1.80	1.82
Vapor pressure @ 20°C	Torr	2×10^{-5}	1×10^{-7}	1×10^{-8}
Vapor pressure @ 100°C	torr	2×10^{-5}	1×10^{-4}	1×10^{-4}
Refractive index @ 20°C	—	1.300	1.297	1.296
Surface Tension @ 20°C	dyne/cm	24	22	22
Polydispersity	Mw/Mn	1.5	1.05	1.15

Fomblin Z TETRAOL

Properties	Units	Fomblin Z TETRAOL
Functional Groups	—	1° and 2° alcohol
Appearance	visual	clear liquid
Color	visual	colorless
Average Equivalent Wt. (NMR)	a.m.u.	500
Functionality	%	4
Kinematic Viscosity (20°C)	cSt	2000
Specific Gravity (20°C)	g/ml	1.75
Vapor Pressure (20°C)	torr	5×10^{-7}
Vapor Pressure (100°C)	torr	2×10^{-4}

For information contact your Solvay Solexis representative or:

Europe
Solvay Solexis S.p.A. (Italy)
Tel: +39-02-3835-1
Fax: +39-02-3835-2129
Email: solvaysolexis.ita@solvay.com

North America
Solvay Solexis, Inc.
Tel: +1-856-853-8119
Fax: +1-856-853-6405
Email: solvaysolexisinfo@solvay.com

Fomblin®

Solvay Solexis

SOLVAY

Fomblin Z Derivatives

Product Data Sheet

Fomblin®

Fomblin Z-DOL TX		
Properties	**Units**	**Z DOL TX**
Functional Groups	—	Alcohol
Appearance	Visual	Clear Liquid
Average Molecular Wt. (NMR)	A.M.U.	2100
Difunctional Content (NMR)	%	94
C2/C1 Ratio (NMR)	—	1
Kinematic Viscosity (at 20°C)	cSt	145
Specific Gravity (20°C)	g/ml	1.73
Vapor pressure (20°C)	torr	2×10^{-5}
Vapor pressure (100°C)	torr	2×10^{-3}
Surface Tension (at 20°C)	dyne/cm	23

Two special grades ZDOL TXS and ZTETRAOL 2000 S with very low content of inorganic ions are also available.

Fomblin AM 2001 & AM 3001

Fomblin AM 2001 and AM 3001 are difunctional aromatic terminated perfluoropolyethers. The high electron density of the end group affords greater interaction with certain substrates, thereby imparting exceptional surface lubricity, even as a monolayer, with low lubricant migration.

Fomblin AM 2001 & AM 3001			
Properties	**Units**	**AM 2001**	**AM 3001**
Functional Groups	—	Aromatic	Aromatic
Appearance	visual	Clear liquid	Clear Liquid
Average Molecular Wt. (NMR)	a.m.u.	2400	3200
Difunctional Content (NMR)	%	94	94
C2/C1 Ratio (NMR)	—	1.0	1.0
Kinematic Viscosity (at 20°C)	cSt	75	90
Specific Gravity (20°C)	g/ml	1.72	1.75
Vapor Pressure (20°C)	torr	1×10^{-7}	1×10^{-8}
Vapor Pressure (100°C)	torr	2×10^{-5}	1×10^{-4}
Surface Tension (at 20°C)	dyne/cm	25	25

For information contact your Solvay Solexis representative or:

Europe
Solvay Solexis S.p.A. (Italy)
Tel: +39-02-3835-1
Fax: +39-02-3835-2129
Email: solvaysolexis.ita@solvay.com

North America
Solvay Solexis, Inc.
Tel: +1-856-853-8119
Fax: +1-856-853-6405
Email: solvaysolexisinfo@solvay.com