AGC

Your Dreams, Our Challenge

Fluorinated Solvents

Fluorinated Solvents

AGC Chemicals is one of the world's leading producers of fluorochemicals and fluorochemical materials. AGC's venture into the field of chemistry first began over a 100 years ago, with in-house production of soda ash, a raw material for flat glass. Guided by the vision of "Chemistry for a Blue Planet", at AGC Chemicals we continue to provide a wide variety of products that contribute towards a fulfilling, safe and comfortable society and environment, from basic chemicals to fluoride-based high-performance chemicals.

There is a team of dedicated product and marketing managers and customer service representatives located at the commercial office of AGC Chemicals Europe, in Amsterdam, The Netherlands. A wide range of fluorinated and speciality chemicals are available for customers throughout Europe, the Middle East and Africa.

The fluorinated solvent range, manufactured by AGC Inc. in Japan, was designed to address environmental problems such as ozone depletion and global warming. AGC offers non-flammable and safer solvents as well as solvent-based blends, which are used for the degreasing of metal products, precision cleaning and defluxing of electronic circuitry. Other applications include carrier for silicone and fluorinated lubricants, heat transfer fluid and drying.

Solvents from AGC have no flash point and therefore explosion-proof equipment is not required when using them.
The full product range consists of pure solvents and solvent blends, marketed under the brand names ASAHIKLIN™ and AMOLEA™.

Cleaning Applications

The selection of the most appropriate solvent depends largely on the type of pollution:

- Heavy (waxes, pitches or glues) – AMOLEA™ AT2
- Medium (processing oils or fluxes) – AMOLEA™ AS-300 or AMOLEA™ AT1
- Light (dust particles) – ASAHIKLIN™ AE-3000

Other Applications

Application	Examples	Recommended Product
Drying	De-watering after aqueous cleaning	ASAHIKLIN™ AE-3100E
	Co-solvent after Hydrocarbon cleaning	ASAHIKLIN™ AE-3000
Diluent	Fluorinated oils	AMOLEA™ AS-300
		ASAHIKLIN™ AE-3000
		ASAHIKLIN™ AC-6000
	Silicone oils	AMOLEA™ AS-300
		AMOLEA™ AT1
		AMOLEA™ AT2
	Others	AMOLEA™ AS-300
		AMOLEA™ AT1
		ASAHIKLIN™ AE-3000
		ASAHIKLIN™ AC-6000
Heat Transfer	Brine	AMOLEA™ AS-300
		ASAHIKLIN™ AE-3000
		ASAHIKLIN™ AC-6000

AMOLEA™ AS-300

Rising environmental awareness in recent years has created a strong demand for new fluorinated solvents with decreased Ozone Depletion Potential (ODP) and Global Warming Potential (GWP). AMOLEA™ AS-300 is our next-generation, fluorinated, non-flammable solvent with low environmental impact and maximum cleaning power. With an ODP of 0.00002 and a GWP of less than 1, AMOLEA™ AS-300 is the first ever fluorinated solvent that exerts minimal impact on our global environment, while still delivering excellent solvency and an optimal boiling point.

Features

- Very low GWP (Global Warming Potential)
- Almost zero ODP (Ozone Depletion Potential)
- Excellent solvency (high Kb value) without trans-1,2-dichloroethylene
- Ideal boiling point for cleaning applications (54°C)
- Improved safety – high AEL (Allowable Exposure Limit) and no flash point
- Contributes to lower consumption of solvent

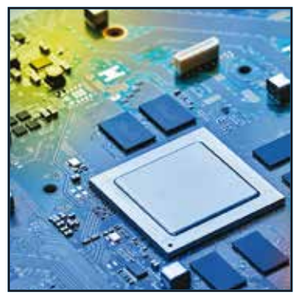
Applications

- Substitution of bromine-based solvents
- Degreasing of metal and precision parts
- Degreasing of aerospace parts
- Degreasing of semiconductors and electronic parts
- Defluxing of printed circuit boards
- Cleaning during pre-plating
- Dilution of silicone oils and fluorinated greases
- Carrier for fluorinated oils and greases
- Substitution of trans-1,2-dichloroethylene blended solvents

Product Comparison by Application

Application	AS-300	AK*-225 (HCFC)	HFE
Degreasing	✓	✓	
Particle cleaning	✓	✓	✓
Metal cleaning	✓	✓	
Precision cleaning	✓	✓	✓
Defluxing	✓	✓	
Dilution of fluorinated oils	✓	✓	✓
Dilution of silicone oils	✓	✓	

*ASAHIKLIN™ AK-225 shown for comparison only. Not available in Europe.



Pure Solvents

ASAHIKLIN™ AE-3000

ASAHIKLIN™ AE-3000 is a hydrofluoroether (HFE) with an Ozone Depletion Potential (ODP) of zero and a Global Warming Potential (GWP) of 580. It has low surface tension and high permeability, so it can even eliminate particles remaining in fine gaps. Its boiling point is low compared to a water/IPA (2-propanol)/hydrocarbon solvent. It is ideal for drying parts that could be damaged by heat or as a flame suppressant in t-DCE blends.

ASAHIKLIN™ AC-6000

ASAHIKLIN™ AC-6000 is a hydrofluorocarbon (HFC) with an ODP (Ozone Depletion Potential) of zero and a GWP (Global Warming Potential) of 136, and is a fluorinated solvent with properties similar to PFC (perfluorocarbons) and PFPE (perfluoropolyether). It maintains a liquid form over a wide range of temperatures and is thermally and chemically stable.

Features

- Low viscosity
- Surface tension
- Recyclable through distillation
- Fast drying
- Good coating performance
- Non-flammable / no flash point
- Recoverable through distillation

Applications

- Precision cleaning
- Electronics cleaning
- Carrier fluid
- Co-solvent drying (solvent drying)
- Rinsing

	AMOLEA™ AS-300	ASAHIKLIN™ AE-3000	ASAHIKLIN™ AC-6000
Chemical structure	HCFO	HFE	HFC
Boiling point	54°C	56°C	115°C
Freezing point	-82°C	-94°C	-76°C
Ozone depleting potential	0.00	0.00	0.00
Global warming potential	<1	580*	136**
AEL	250ppm	50ppm	-
Kb value	44	13	5
Packaging	20kg pail	20kg pail	20kg pail
	250kg drum	300kg drum	300kg drum

* Intergovernmental Panel on Climate/Technology & Economic Assessment Panel Report in 2007
** Calculated Value by the National Institute of Advanced Industrial Science and Technology (AIST)

Fluorinated Solvent Blends

ASAHIKLIN™ AE-3100E

ASAHIKLIN™ AE-3100E is a non-flammable mixture of Hydrofluoroether (HFE-347pc-f) and Ethanol that has excellent material compatibility, low surface tension, and zero ODP, which is ideally suited for drying plated carbide metals before coating.

AMOLEA™ AT1

AMOLEA™ AT1 is an azeotropic mixture of trans-1,2-dichloroethylene, HFE-347pc-f (ASAHIKLIN™ AE-3000) and ethanol. It is suitable for use as a carrier solvent of silicone oil.

AMOLEA™ AT2

AMOLEA™ AT2 is a mixture of trans-1,2-dichloroethylene, HFE-347pc-f (ASAHIKLIN™ AE-3000) and a fluorinated solvent. It is a non-flammable, non-ozone depleting solvent with low global impact, which allows users to more easily meet environmental regulations. AMOLEA™ AT2 is energy efficient due to its low latent heat of vaporisation.

Features

- High Kb (Kauri-butanol) value
- Low GWP (Global Warming Potential)
- Zero ODP (Ozone Depletion Potential)
- Good compatibility with most metals
- Non-flammable / no flash point
- Recoverable through distillation
- Excellent thermal, chemical and hydrolytic stability

Applications

- Electronics industry (press oils, cutting oils, silicone oils, fluxes, greases, waxes and asphalt pitches)
- Medical devices (orthopaedic implants, catheters, tubes, scopes, needles, dental devices and surgical tools)
- De-watering / moisture displacement
- Carrier Fluid
- Optical lens

	AMOLEA™ AT1	AMOLEA™ AT2	ASAHIKLIN™ AE-3100E
Chemical structure	HFE / t-DCE / EtOH	HFE / t-DCE	HFE / EtOH
Boiling point	42°C	44°C	54°C
Freezing point	-50°C	<-40°C	-86°C
Ozone depleting potential	0.00	0.00	0.00
Global warming potential	274	112	540
AEL	100ppm	150ppm	50ppm
Kb value	38	66	14
Packaging	20kg pail	20kg pail	20kg pail
	250kg drum	250kg drum	250kg drum

Physical Properties

	Unit	Pure Solvents			Blends		
		AMOLEA™ AS-300	ASAHIKLIN™ AE-3000	ASAHIKLIN™ AC-6000	AMOLEA™ AT1	AMOLEA™ AT2	ASAHIKLIN™ AE-3100E
Boiling point	°C	54	56	115	42	44	54
Freezing point	°C	-82	-94	-76	-50	<-40	-86
Ozone depleting potential	-	0.00	0.00	0.00	0.00	0.00	0.00
Global warming potential	-	<1	580	136	274	112	540
AEL	ppm	250	50	-	100	150	50
Kb value	-	44	13	5	38	66	14
Flash point	°C	none	none	none	none	none	none
Viscosity (25°C)	mPa·s	0.57	0.65	1.08	-	-	0.6
Kinematic viscosity (25°C)	μm2/s	0.41	0.44	0.71	-	-	0.43
Density (25°C)	kg/m^3	1390	1470	1556	1300	1300	1400
Surface tension (25°C)	mN/m	21.7	16.4	15.5	17.9	20.5	16.1
Vapour pressure (25°C)	kPa	32.7	31	2.6	56	50	28
Specific heat (25°C)	KJ/kg·K	1.34	1.28	1.19	1.34	1.21	1.33
Latent heat of vaporisation	KJ/kg	213	163	78	200	218	200
Relative evaporation rate	Ether=100	64	67	11	98	92	66
Solubility of water	ppm	1500	900	50	1670	720	5300
Dielectric constant (23°C)	-	12.3	6.6	5.1	-	-	-
Electrical resistivity	Ω·m	8.7×10^6	1.3×10^9	3.4×10^{10}	-	-	-
Electrical conductivity (23°C)	μS/m	1.1×10^{-1}	7.7×10^{-4}	2.9×10^{-5}	-	-	-
Dielectric breakdown voltage (23°C)	kV	-	39.5	27	-	-	-
Critical temperature	°C	-	190	245	-	-	-
Critical pressure	MPa	-	2.7	1.8	-	-	-
Kinematic viscosity (-40°C)	$\mu m^2/s$	-	1.31	1.65	-	-	-
Thermal conductivity (25°C)	mW/(m·K)	108	89	66.8	-	-	-

Material Compatibility

Effect on Metals

No detrimental effects when the ASAHIKLIN™ or AMOLEA™ series are used to clean stainless steel, aluminium, copper, brass or other metals.

Effect on Plastics and Elastomers

Test Conditions: Samples were immersed for 3 days in AMOLEA™ AS-300, ASAHIKLIN™ AE-3000, ASAHIKLIN™ AE-3100E at boiling point, and in ASAHIKLIN™ AC-6000 at 50°C.

Material	AMOLEA™ AS-300		ASAHIKLIN™ AE-3000		ASAHIKLIN™ AE-3100E		ASAHIKLIN™ AC-6000	
	Weight Change (%)	Linear Swell (%)	Weight Change (%)	Linear Swell (%)	Weight Change (%)	Linear Swell (%)	Weight Change (%)	Linear Swell (%)
Polypropylene	A	A	A	A	A	A	A	A
Polystyrene	D	D	A	A	A	A	A	A
Polymethyl Methacrylate	D	D	C	C	C	C	A	A
ABS	D	D	A	A	B	A	A	A
PTFE	A	A	A	A	A	A	A	A
Fluoroelastomer	D	D	D	C	D	C	B	A
Silicone Rubber	D	D	B	A	C	A	B	A
EPDM	B	A	A	A	A	A	A	A

Key

AGC Chemicals RUS
Russian Federation, 121596
Moscow, Gorbunova Street 2
Grand Setun Plaza, Bldg. 204, BC
5th Floor, Block B, Office B 504
Tel: +7 918 555 34 37
www.agcce.com/главная

AGC Chemicals Americas, Inc.
55 E. Uwchlan Avenue
Suite 201
Exton, PA 19341
USA
Tel: +1 610-423-4300
www.agcchem.com

AGC Chemicals Trading (Shanghai) Inc.
Room 2701-2705, Metro Plaza
555 Lou Shan Guan Road
Chang Ning Ward, Shanghai
China 200051
Tel: +86-21-6386-2211
www.agcsh.com

AGC Inc.
AGC Chemicals
1-5-1, Marunouchi
Chiyoda-ku
Tokyo 100-8405
Japan
Tel: +81-3-3218-5574
www.agc-chemicals.com

AGC Asia Pacific Pte. Ltd.
460 Alexandra Road
#30-01 PSA Bldg.
Singapore 119963
Tel: +65-6273-5656
www.agc.com

AGC Chemicals (Thailand) Co., Ltd.
24th Floor
Bangkok Insurance Bldg.
25 South Sathorn Road
Bangkok 10120
Thailand
Tel: +66-2-679-1600
www.acth.co.th

AGC Chemicals South America
AGC Divisão Química
Al. Ministro Rocha Azevedo,
38, 2° andar, cj. 201
Cerqueira César – São Paulo, SP
Brasil – CEP 01410-000
www.agcbrasil.com

AGC

European Office:

AGC Chemicals Europe, Ltd.
Commercial Centre
World Trade Center
Zuidplein 80
1077 XV Amsterdam
Netherlands
Tel: +31 20 880 4170
www.agcce.com

REF: SOLVENTS 04-2020