

New HFO Blowing Agent with Excellent Performances

AMOLEA™ 1224yd

AGC

AMOLEA™ 1224yd is a blowing agent which is suitable for foam application where superior environmental, flammability, and foam properties are required.

Foam applications include polyurethane, polyisocyanurate, and various polymer foams.



AMOLEA™ 1224yd (HFO-1224yd(Z))

Molecular formula	(Z)-CF ₃ CF=CHCl
Molecular weight	148.5 g/mol
Boiling point	15 °C
Liquid density (25°C)	1,361 kg/m ³
Vapor pressure (25°C)	151 kPa
Thermal conductivity (gas, 25°C)	9.1 mW/m·K
Atmospheric Lifetime	20 days*
ODP (CFC-11=1)	0.00023*
GWP (IPCC AR5)	0.88*
LC ₅₀	213,000 ppm
AEL	1,000 ppm
Flammability (ASTM E681)	Non-flammable

*Measured by the National Institute of Advanced Industrial Science and Technology (AIST)

Your Dreams, Our Challenge

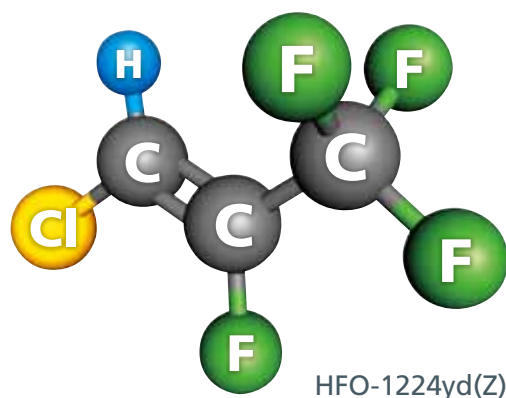
What is AMOLEA™ 1224yd?

Concepts

AMOLEA™ is a next-generation solvent and refrigerant brand developed by AGC under the concept of "dramatically reducing GWP with superior performance."



*AMOLEA™: AGC Makes Hydrofluoro-Olefins as Alternatives



HFO-1224yd(Z)

Features

- Chemical and physical properties similar to HFC-245fa
- Good compatibility with plastics and elastomers
- Low thermal conductivity
- GWP under 1*
- Zero-ODP (0.00023 as CFC-11=1*)
- Low-toxicity (LC₅₀ > 213,100ppm, AEL=1,000ppm)
- Non-flammable (ASTM E681)

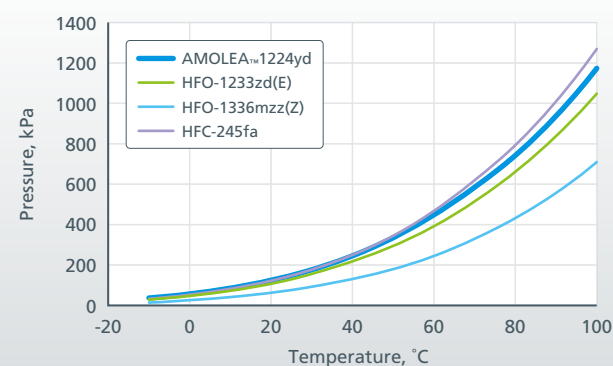
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Application

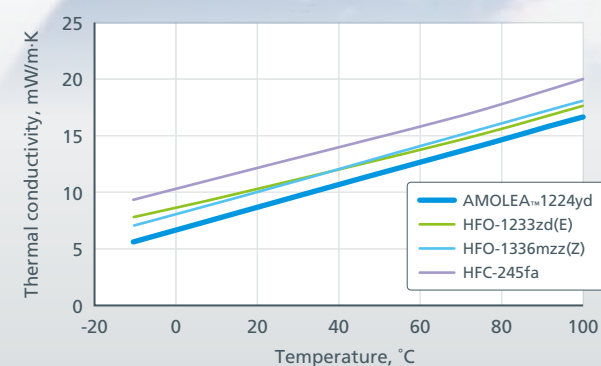
- Blowing agent
- Centrifugal Chiller
- High-temperature heat pumps
- Aerosol solvent
- Organic Rankine Cycle (e.g. Binary cycle)
- Solvent

Properties

Vapor pressure



Thermal conductivity



Material compatibility

Plastics				
Blowing agent	AMOLEA™ 1224yd		HFC-245fa	
Material	Weight change, %	Volume change, %	Weight change, %	Volume change, %
PVC (Rigid)	0	0	0	0
PVC (Soft)	-8	-12	N.D.	N.D.
LDPE	7	4	1	0
HDPE	4	3	N.D.	N.D.
Polypropylene	9	5	2	0
Polystyrene	11	8	0	0
Acrylic resin	Dissolved	Dissolved	Dissolved	Dissolved
Polycarbonate	1	1	0	0
Polyphenylene oxide	8	5	N.D.	N.D.
Phenolic resin	0	0	-1	0
ABS resin	9	6	2	0
Nylon 66	0	-2	-1	-1
Epoxy resin	0	0	0	0
PTFE	5	7	2	1

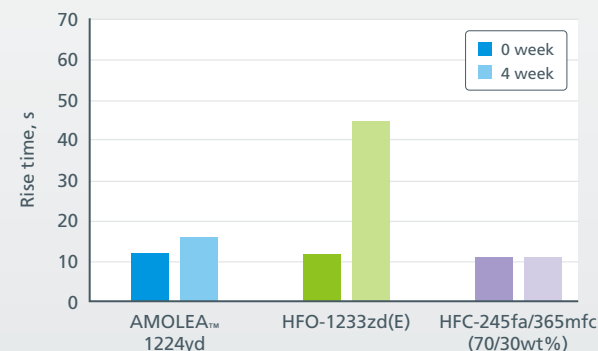
Shelf stability study

(Rise time measurements)

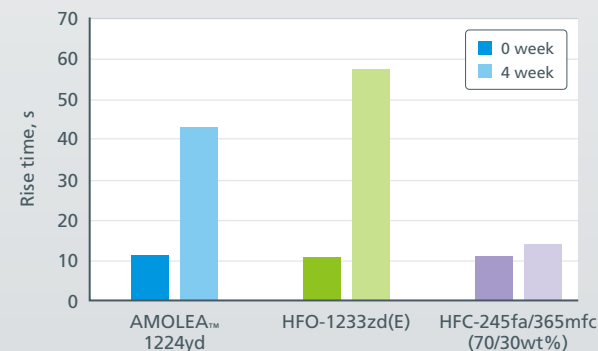
Formulation		
Polyester polyol (OHV: 315mgKOH/g)	pbw	70
Polyether polyol (OHV: 590mgKOH/g)	pbw	30
TCPP	pbw	20
Surfactant SH-193	pbw	1.0
TEDA®-L33	pbw	10.0
Water	pbw	1.0
Blowing agent	pbw	0.218mol
Polymeric MDI	pbw	171.9
INDEX		160

Foam condition
Hand Mix Foaming, Mixing Conditions: 3000rpm×5sec, Component Temp. :15°C

Component Storage Temp. :23°C



Component Storage Temp. :40°C



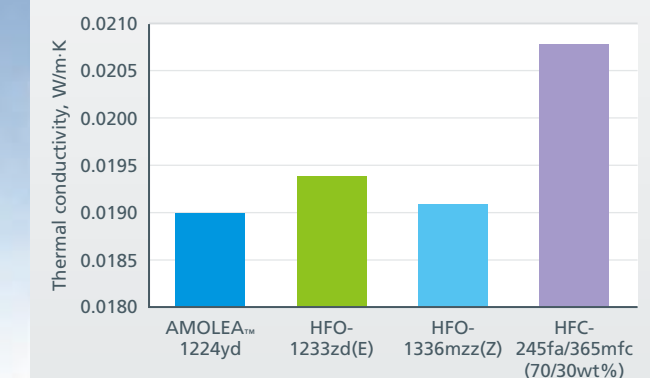
Elastomers						
Blowing agent	AMOLEA™ 1224yd			HFC-245fa		
Material	Weight change, %	Volume change, %	Elution %	Weight change, %	Volume change, %	Elution %
Natural rubber	2	-3	9	2	1	1
Silicone rubber	93	103	3	12	10	1
Urethane rubber	56	49	0	26	21	0
Butyl rubber	2	-3	13	-4	-6	5
Chlorosulfonated polyethylene rubber (Hypalon-)	11	9	5	-1	-3	2
Chloroprene rubber	6	3	11	-3	-6	6
EPDM	6	1	9	1	0	1
Nitrile rubber	2	-4	10	6	4	7
FKM	41	56	1	70	109	3
HNBR	18	9	12	21	14	10

Polyurethane spray foam

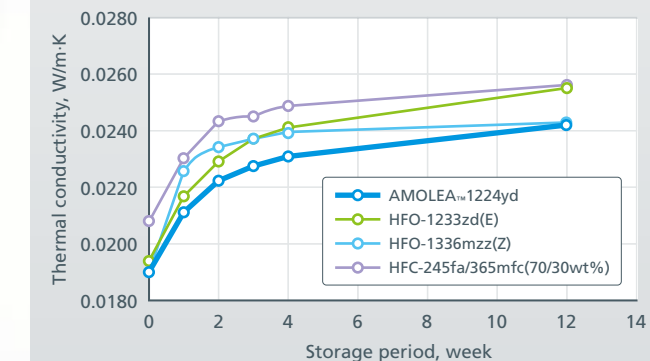
Blowing agent	AMOLEA™ 1224yd	HFO-1233zd(E)	HFO-1336mzz(Z)	HFC-245fa/365mfc (70/30wt%)
Formulation				
OHV mgKOH/g	590	590	590	590
Polyether polyol pbw	100	100	100	100
TCPP pbw	20	20	20	20
Surfactant SH-193 pbw	1.0	1.0	1.0	1.0
POLYCAT® 41 pbw	0.5	0.4	0.5	0.4
PUCAT 15G (K15%) pbw	0.5	0.4	0.5	0.4
Water pbw	1.0	1.0	1.0	1.0
Blowing agent pbw	32.5	28.5	35.6	30.0
Polymeric MDI pbw	173.3	173.3	173.3	173.3
INDEX	110.0	110.0	110.0	110.0

		Foam properties			
Reaction time	c.t., s	12	12	12	12
	g.t., s	32	31	31	32
	r.t., s	39	38	37	40
Foam density	kg/m³	32.0	33.8	32.5	34.1

Foam condition
Hand Mix Foaming, Mixing Conditions: 3000rpm×5sec, Component Temp. :15°C
Thermal conductivity measurement
Sample size: 190×190×25mm, Condition: Mean Temp. :23°C, according to JIS A9511



Foam Storage Temp. :70°C



Environmental Impact

Blowing agent	HFOs			HFC
	AMOLEA™ 1224yd	HFO-1233zd(E)	HFO-1336mzz(Z)	HFC-245fa
AEL, ppm	1,000	800	500	300
ODP	0.00023*	0.00024	0	0
GWP (IPCC AR5)	0.88*	1	2	858
MOP HFC regulation	N.A.	N.A.	N.A.	Applicable
EPA-SNAP	Applying	Registered	Registered	To be delisted
REACH	Registered	Registered	Registered	Registered

*Measured by the National Institute of Advanced Industrial Science and Technology (AIST)

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