

ecomate®

Product Highlights and Technical Information

Rigid Foams

产品简介与技术数据

硬质泡沫塑料



SUSTAINABLE | ENVIRONMENTALLY BENIGN | ENERGY EFFICIENT | HYGIENICALLY SAFE

可持续 | 环保 | 节能 | 安全



Better Products. Better for the Environment.

更优越的产品 更好地保护环境

 foam supplies, inc.

Success
through
Innovation

ecomate®



Environmentally friendly blowing agent and family of polyurethane systems

Ecomate® blowing agent technology was born from the innovation of the Foam Supplies Chemistry Department. The advent of ecomate® technology and its evolution has become yet another benchmark in Foam Supplies' history of formulating superiority and proves once again *Success Through Innovation*.

Ecomate® 发泡剂技术是 Foam Supplies 公司化学部最先研发出来的。Ecomate® 技术的发展已经成为 Foam Supplies 公司技术创新史的另一项辉煌成就，这再一次证明：成功通过创新取得

FAST FACTS – 快讯

- In one year alone, FSI customers reduced CO₂ emissions by 549,817 mt. Three times greater than the closest competitor.
- 仅在一年时间里，FSI 公司的客户减少二氧化碳排放量达 549,817 吨，比最接近的竞争对手高出三倍。
- Ecomate® is not petro-chemical based.
- Ecomate® 不使用石油化工原料。



1998 年

FSI begins search for next generation blowing agent.
FSI 开始寻找下一代发泡剂。

2001 年

Ecomate® system successfully passes initial Class 1 (UL E-84) testing.
Ecomate® 系统通过 Class 1 (UL E-84) 测试。

2002 年

Original ecomate® worldwide patent application filed. Additional patents granted in 2006, 2007, 2008, 2009, 2010.
Ecomate® 获得全球专利。2006, 2007, 2008, 2009, 2010 年获附加专利。

2003 年

95% of FSI HCFC customers successfully converted to ecomate®.
FSI 公司 95% 的 HCFC 客户成功地改用 ecomate®。

2004 年

E.P.A. SNAP listed and granted VOC-Exempt Status. FSI achieves UL E-84 certification with ecomate® system on panels ranging from 1.5–6 in (38.1–152.4 mm) with a density of 1.98–2.64 pcf (31.7–42.3 kg/m³).

E.P.A. SNAP 确认 ecomate® 不含挥发性有机化合物。FSI 公司 ecomate® 系统 1.5–6 英寸 (38.1 - 152.4 毫米)，密度 1.98 - 2.64 pcf (31.7 - 42.3 kg/m³) 的板料获得 UL E-84 认证。

2005 年

International presence established in Australia, Brazil and UK.
International partnerships grown in China, India, MEAF, South Africa and South Korea.
在澳大利亚、巴西和英国建立商业联系。
与中国、印度、MEAF, 南非和韩国建立国际伙伴关系。

2006 年

FSI discontinuous panel producer achieves Factory Mutual (FM) approval using ecomate® Class 1 system.
使用 ecomate® Class 1 系统之 FSI 非连续板料生产厂家获得工厂互检 (FM) 认可。

2007 年

United States Coast Guard approves an ecomate® system for use in Life Rings.
美国海岸警卫队批准在救生圈上使用 ecomate® 系统。

2008 年

FSI customer exceeds Energy Star standards by 23.7% utilizing ecomate® technology. Ecomate® receives Environmental Innovation Award at IBEX Trade Show.
使用 ecomate® 技术的 FSI 公司客户优于能源之星标准 23.7%。
Ecomate® 获得 IBEX 展览会的环境创新奖。

2009 年

GRAS (Generally Regarded As Safe) Status achieved.
获得 GRAS 认证 (一般认为安全)。

2010 年

85% of all FSI customers have successfully converted to ecomate® technology. Significant McDonald's supplier converts all foaming locations to ecomate®. EU and India Patent Rights granted. FSI now has patent rights in the three largest emerging economies: Brazil, China and India.
FSI 公司 85% 的客户已经改用 ecomate® 技术。麦当劳的主要发泡用品供货商已经全部改用 ecomate®。获得欧盟和印度专利权，FSI 公司在三个最大的新兴经济体 (巴西、中国和印度) 也拥有专利权。

2011 年

FSI opens office in New Delhi, India
FSI 公司在印度新德里成立新公司。

2012 年

International partnerships added in Turkey, Philippines, Malaysia and other locations.
FSI 公司在土耳其、菲律宾、马来西亚和其他地点新增了国际伙伴关系。

环保发泡剂和聚氨酯系统

Ecomate® is the *Swiss Army Knife of Blowing Agents*

Ecomate® is a true liquid blowing agent designed for use in rigid insulating foams, spray foams, integral skin foams, and various flexible foams. Foam Supplies and our ecomate® global partners are constantly finding new uses for this versatile blowing agent.

Ecomate® 是发泡剂中的佼佼者

Ecomate® 是真正的液体发泡剂，用于硬质绝缘泡沫，喷射泡沫，自结皮泡沫和各种软泡沫。Foam Supplies 及 ecomate® 之全球合作伙伴还在不断寻找这种多功能发泡剂新的应用领域。

Is Your Product Headed in the Right Direction?

Environmentally benign blowing agent ecomate® and its systems are non-GWP, non-ODP, and VOC exempt, with good mechanical and thermal properties. Ecomate® fulfills current and future regulatory requirements and is both U.S. EPA and SNAP approved to replace HCFCs, HFCs, and SMOG producers such as hydrocarbons (HCs). No other blowing agent can match ecomate's® sustainability. Be kind to our environment and your customers. Choose ecomate®.

您的产品是否朝着正确的方向发展？

环保型发泡剂 ecomate® 及其系统是0-GWP, 0-ODP, 和0-VOC, 并具有良好的机械和热性能。Ecomate® 满足当前和未来的规管要求，并获美国环保局和SNAP批准用以替代氟氯烃、氟化烃和烟雾产生者(例如碳氢化合物)。在可持续性方面，没有任何发泡剂可以与 ecomate® 相比。为我们的环境和您的客户着想，马上选用 ecomate® 吧。

Open to Change? Your Customers Are.

Ecomate® offers users of HCFCs, HFCs, and HCs the unique option to "leap frog" and eliminate the need

for additional changes due to current and future environmental regulation. Ecomate® allows OEMs to continue delivering on the increasing demands (improved thermal efficiency, adhesion, even density distribution, GRAS Approval to name a few) of the end consumer.

适应改变？你的客户正是这样

Ecomate® 为使用HCFC, HFC 和 HC的用户提供独特的“跨越式”的解决方案，不再需要为了适应当前和未来的环保规例而作额外的改变。Ecomate® 能很好地满足消费者对原厂制造商在（热效率、附着力、密度均匀性、GRAS认证等等）日益增加的要求。

The Superior Choice. A Sea of Possibilities Awaits with Ecomate®.

Since 2000, ecomate® has been field proven to deliver excellent solubility, processing and foam properties. Most importantly ecomate's® superior qualities have proven to be cost effective, offering an economical choice for those utilizing HCFCs, HFCs, and HCs. Ecomate® requires little to no equipment, plant, facility or production changes. As the world moves toward reducing the threat of ozone depletion, global warming, smog and other dangers to human life, every sector of manufacturing will be affected. Ecomate® ensures that you will keep ahead of the ever-changing regulatory and consumer trends.

明智的选择。Ecomate® 为您提供无限的可能性

2000年以来，事实不断证明 ecomate® 能提供优良的溶解性，加工性和发泡性能。最重要的是，ecomate® 的卓越质量已经被证明成本效益极好，为使用 HCFC, HFC 和 HC 的产品提供经济实惠的选择。Ecomate® 很少或几乎不需要对设备、厂房、设施或生产过程作任何改变。随着世界对臭氧减少、全球变暖、烟雾和生命面临的其它种种威胁越来越重视，每个生产商都会受到影响。Ecomate® 保证让你在不断变化的规管和消费趋势中棋先一步。

End Use Applications

Rigid Foam	Automotive
Spray Foam	Boardstock & Continuous
Integral Skin Foams	Panel Mfg.
Flexible Foams	Commercial Foodservice
Reaction Injection Molding	Refrigerated Transportation
'Roto-Mold' Applications	SIPS & Discontinuous Panels
Pour in Place Applications	U.S.C.G. Marine/Flotation
Appliances/White Goods	

产品应用范围

硬质泡沫塑料	汽车
喷涂泡沫	板料和连续夹心板
自结皮泡沫	餐饮业
软泡	冷藏运输
增强反应注射成型	SIPS和非连续板料
滚塑	美国海岸警卫队海军/个人浮具
就地发泡	装备
电器/白色家电	

PHYSICAL PROPERTIES 物理性质

	Ecomate®	
Chemical Name 化学名称	Methyl Formate 甲酸甲酯	
Formula 化学式	HCOOCH ₃	
Molecular Weight 分子量 (g/mol)	60.05	
Boiling Point 沸点 (at 于 101.3 kPa, 14.69 psi)	31.5°C	88.7°F
Vapor Pressure 蒸气压 (Bar at 于 20°C, psi at 于 68°F)	0.62	9
Specific Gravity 比重 (于 20°C, 68°F)	0.98	
Thermal Conductivity of Vapor 蒸气的热导率 (于 25°C/77°F) (mW/m ² ·°K, BTU/(hr.ft ² ·°F))	10.7	0.074
Solubility in water 水中溶解度 (于 23°C/73.4°F)	330 g/kg	33 wt%
Density of Vapor 蒸气密度 (于 20°C/68°F) (Air 空气 =1)	2.07	
Viscosity 粘度 (于 25°C/77°F)	0.355 cps	
Electrical Conductivity 电导率 (ps/m)	1.92x10 ⁸	
Refractive Index 折射率	1.343	

BLOWING AGENT ENVIRONMENTAL IMPACT 发泡剂对环境的影响

Blowing Agent 发泡剂	ODP	GWP	VOC	Atmospheric Lifetime, Years 大气中的寿命	MWt 分子量	†ratio †比率	‡CO ₂ e
Ecomate®	0	0	Exempt 无	0.02	60	1.00	1
CFC-11	1	4750	Exempt 无	45	137.4	2.29	10878
CFC-12	1	10900	Exempt 无	100	120.9	2.02	22018
HCFC-22	0.055	1810	Exempt 无	12	86.5	1.44	2606
HCFC-141b	0.11	725	Exempt 无	9.3	117	1.95	1414
HCFC-142b	0.065	2310	Exempt 无	17.9	100.5	1.68	3881
HFC-134a	0	1430	Exempt 无	14	102	1.70	2431
HFC-152a	0	124	Exempt 无	1.4	66.05	1.10	136
HFC-227ea	0	3220	Exempt 无	34.2	170.3	2.84	9145
HFC-245fa	0	1030	Exempt 无	7.6	134	2.23	2297
HFC-365mfc	0	794	Exempt 无	8.6	148	2.47	1961
n-C5	0	<25	YES 有	0.008	72	1.20	29
c-C5	0	<25	YES 有	0.008	70	1.167	28

Data from US EPA.

†Ratio = MW/60, showing extra blowing agent for same density foam.

‡Carbon Dioxide equivalents [=GWP * Ratio].

数据来源:

†比率=MW/60, 表示生产相同密度的泡沫所需额外的发泡剂数量。

‡二氧化碳当量 [= GWP值*比率]。

SOLUBILITY IN POLYOLS 在多元醇中的溶解度

	Ecomate®	141b	365mfc	n-C5	c-C5
Caradol 585	100	100	32	5	11
Castor Oil	100	100	18	47	100
DEG	100	35	*	*	*
Ethylene Glycol	10	4	3	1	1
IXOL M125	50	37	5	2	5
FM550	100	100	*	*	*
Stepanpol 3152	100	33	30	6	7
Stepanpol 2352	100	30	*	*	*
Terol 256	100	10	*	*	*
Arcol LHT240	100	100	*	*	*
TCP	100	100	100	10	100
PPG 2000	100	100	*	*	*
Teracol A350	100	100	100	36	100
Teracol RF55	100	100	100	4	18
Voranol RA640	100	100	100	20	100
Jeffol R315X	100	100	*	*	*
Voranol 360	100	100	*	*	*
Poly G70-600	100	75	*	*	*

* Not Determined 未确定

MISCIBILITY 混溶性

Ecomate® is an extremely miscible blowing agent. Ecomate® is compatible with all current blowing agents, most organic solvents, surfactants, and catalysts.

Ecomate® 是混溶性极好的发泡剂。Ecomate® 兼容目前所有的发泡剂、大多数有机溶剂、表面活性剂和催化剂。

MATERIALS COMPATIBILITY 材料兼容性

SEALS

PTFE and Kalrez are the recommended seal materials for neat ecomate®. EPDM is acceptable. For Polyol/Resin PU systems with ~5% ecomate®, PTFE, Kalrez, EPDM, Butyl, Viton, Neoprene and silicone have proven acceptable. Buna-N and Santoprene showed fair results. Isocyanate systems with ecomate® had similar results to the Polyol/Resin systems. Each PU system is different and it is recommended that compatibility be tested. Consult with an FSI representative for further clarification.

密封材料

聚四氟乙烯和Kalrez是使用纯ecomate®推荐的密封材料。三元乙丙橡胶是可以接受的。多元醇/树脂 PU系统使用约5%ecomate®, 聚四氟乙烯、Kalrez、三元乙丙橡胶、丁基橡胶、氟橡胶、氯丁橡胶和硅树脂已被证明可以接受。丁腈橡胶和Santoprene效果不错。异氰酸酯系统和多元醇/树脂系统使用ecomate®有类似的效果。每个PU系统都是不同的,因此建议先进行兼容性测试。详情请与FSI公司代表联系。

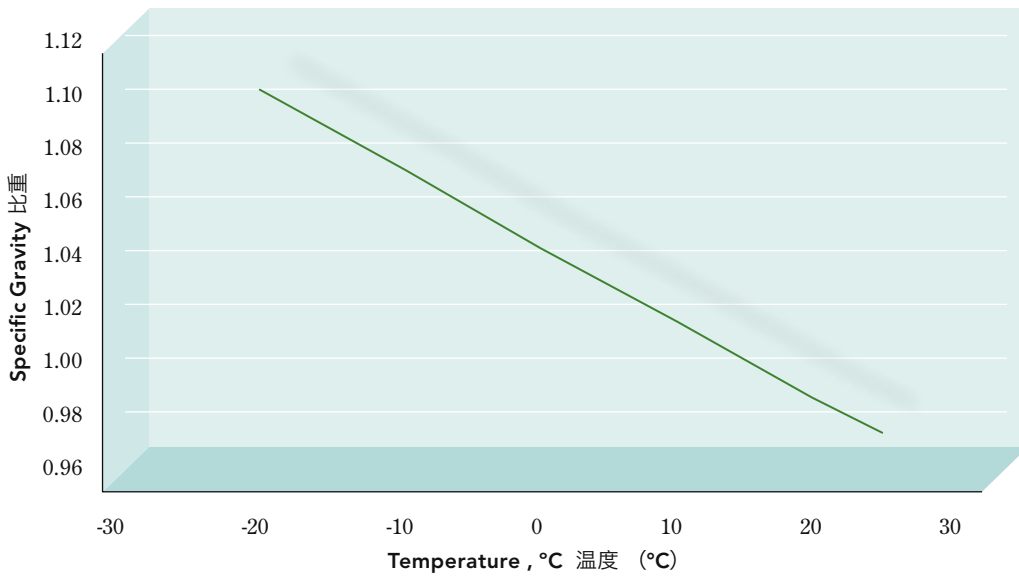
SUBSTRATES AND ADHESION

Ecomate® PU systems have been tested and are currently used with HIPS, ABS, PP, PE, PMMA, PVC, Polycarbonate and other various thermoplastics with favorable results. Compared to legacy PU systems, Ecomate® systems have demonstrated excellent — and in most cases, improved — adhesion to a broad range of plastic, metal and wood substrates.

基底和粘附力

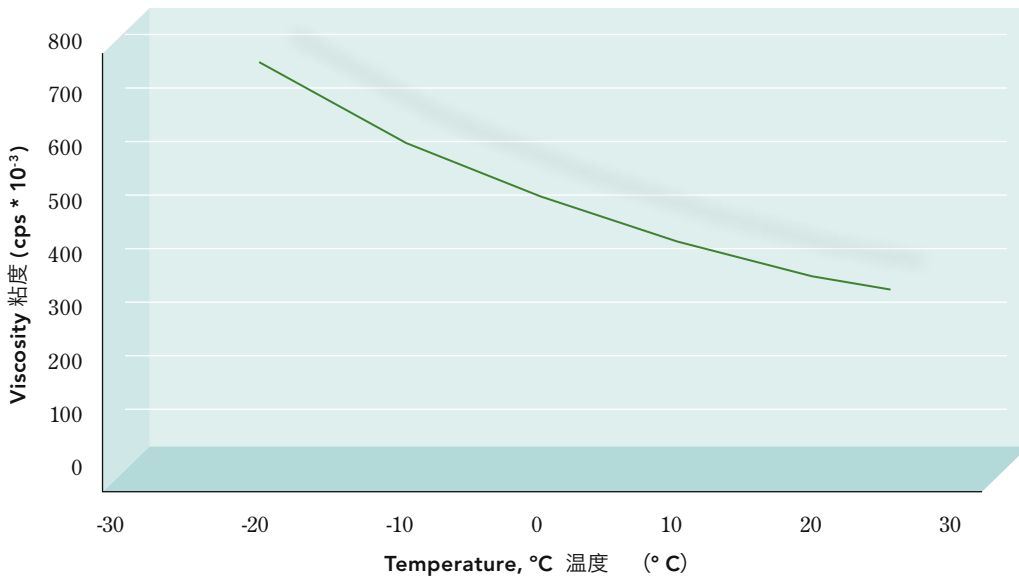
Ecomate®聚氨酯系统已经过测试,目前与高抗冲聚苯乙烯、ABS树脂、聚丙烯、聚乙烯、聚甲基丙烯酸甲酯、聚氯乙烯、聚碳酸酯以及其它各种热塑性塑料配合使用,效果良好。与传统的聚氨酯系统相比,Ecomate®系统展现优越的粘附力,并在绝大多数情况下,改善了与塑料、金属和木质基底的粘附力。





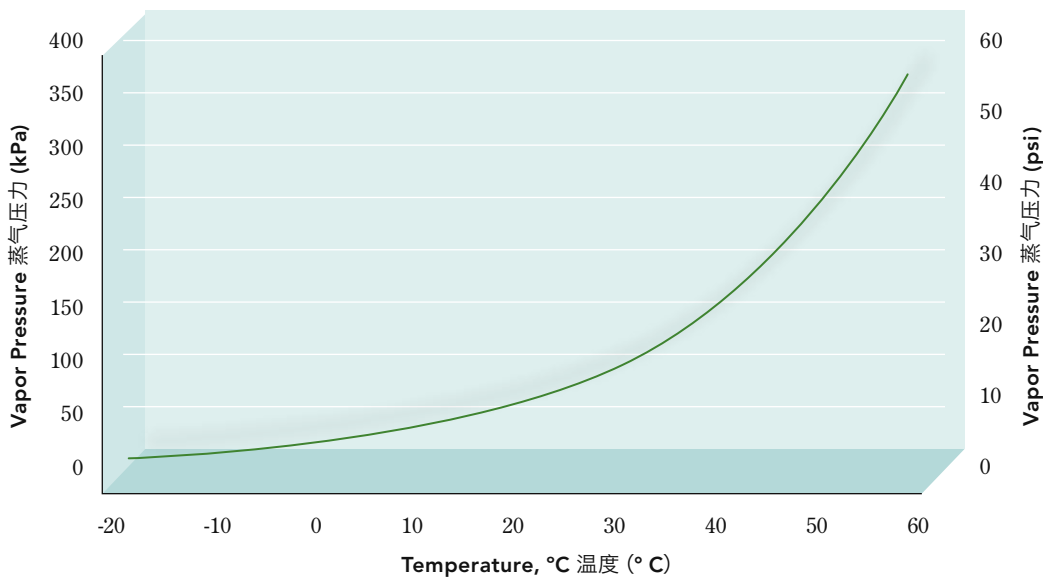
LIQUID DENSITY
At 20 °C / 68 °F the specific gravity is 0.98

液体密度
在 20 °C (68 °F) 时比重为 0.98



VISCOSITY
Ecomate® versus temperature

粘度
Ecomate®之粘度随温度而变化



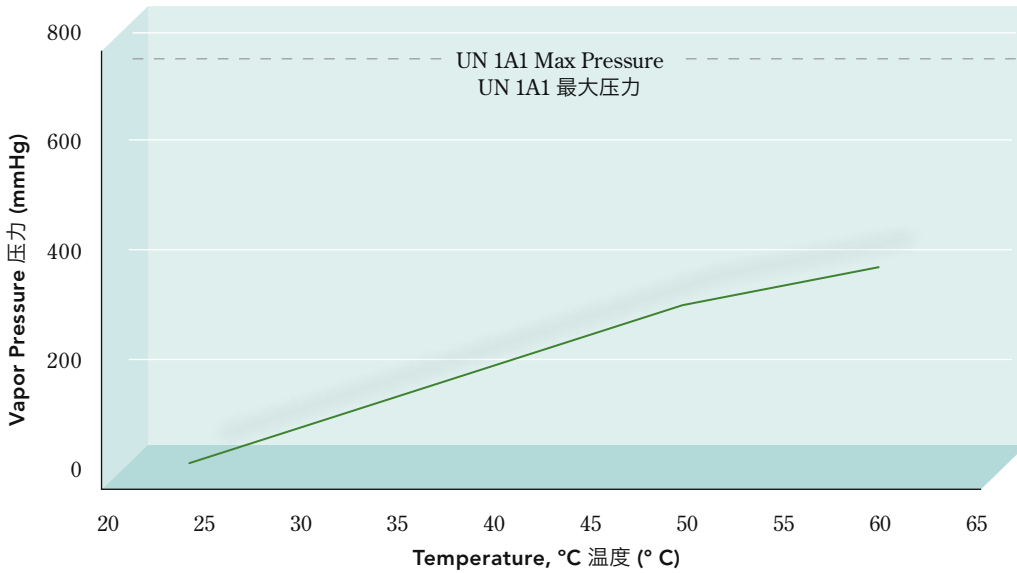
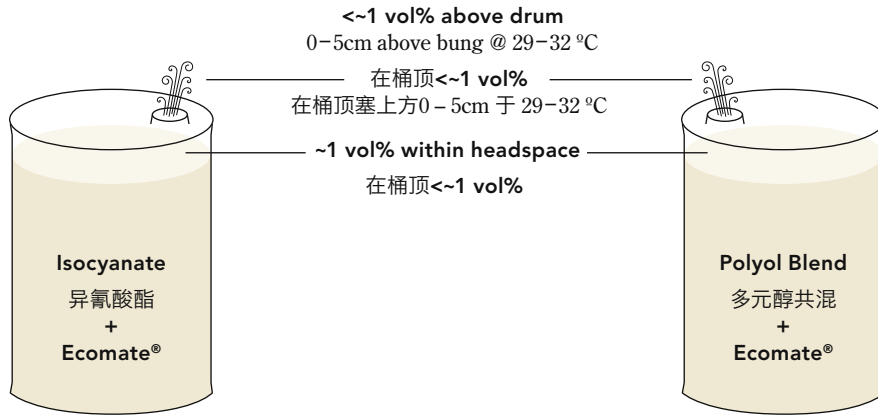
VAPOR PRESSURE OF NEAT ECOMATE®
Ecomate® versus temperature

纯ECOMATE® 的蒸气压力
纯Ecomate®之蒸气压力随温度而变化

ECOMATE® SYSTEMS
EMISSIONS

Stored systems in drums / totes

ECOMATE®系统的排放
存储在圆桶



VAPOR PRESSURE
OF STORED
ECOMATE® BLENDS

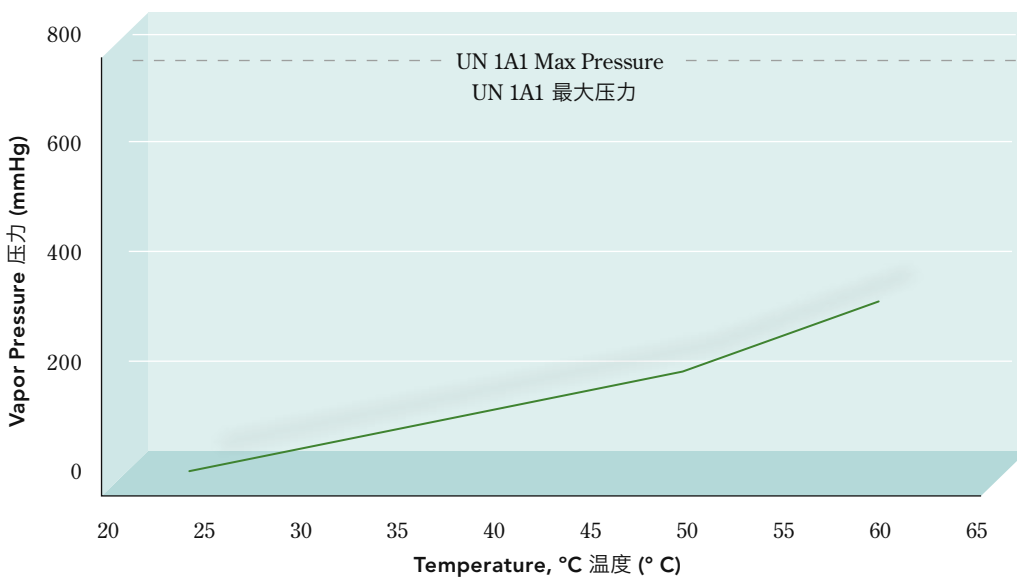
(ASTM D2879, typical data)

Blowing Agent/Isocyanate System
eco3-95-1.7

储存中的 ECOMATE®共混物
蒸气压

(ASTM D2879, 典型数据)

发泡剂 / 异氰酸酯系统
eco3-95-1.7



VAPOR PRESSURE
OF STORED
ECOMATE® BLENDS

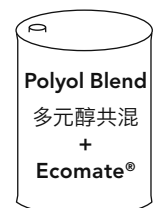
(ASTM D2879, typical data)

Blowing Agent/Polyol System
eco3-95-1.7

储存中的 ECOMATE®共混
物蒸气压

(ASTM D2879, 典型数据)

发泡剂 / 聚醚系统
eco3-95-1.7



HANDLING AND STORAGE 处理和贮存

Thoroughly review the ecomate® Material Safety Data Sheet, Technical Data Sheet, and Product Handling Guide before handling the product. Ecomate® can be stored in small containers and larger bulk-type containment. Small containers should be kept in a cool, dry, well-ventilated area. Keep containers closed when not in use and open slowly to allow any excess pressure to vent. Keep away from heat, sparks, flame, or other sources of ignition. Use proper grounding and bonding procedures when loading, unloading, and transferring. Use spark resistant tools and only use dry nitrogen to pressurize containers. Consult a Foam Supplies representative for the various options for bulk containment. Chemical stability of ecomate® is excellent and is similar to that of HCFC-141b. It should not be exposed to strong alkaline compounds or alkali metals. PU formulations have been observed to be stable in excess of six months.

ENVIRONMENTAL 对环境的影响

Today ecomate® is the only physical blowing agent on the market which is zero ODP, negligible GWP and a VOC exempt compound.

今天 ecomate® 发泡剂是市场上唯一零ODP, GWP值微不足道和无VOC (挥发性有机化合物) 的化学品。

	ODP	GWP	VOC
Ecomate®	0	0	Exempt 无
HCFC-141b	0.12	725	Exempt 无
HFC-245fa	0	1030	Exempt 无
HFC-365mfc	0	794	Exempt 无
c-C5	0	11	Yes 有

STABILITY IN SOLUTION 溶液中的稳定性

Ecomate® systems are very stable. Unlike other blowing agents, ecomate® mixes in readily and easily and does not separate like "oil & water" as many other blowing agents do. Blending of ecomate® does not require sophisticated mixing equipment and/or emulsification equipment and agitators.

Ecomate® 系统非常稳定。Ecomate® 混合容易和方便, 不像其它许多发泡剂混合后有如“油水分离”, 且混合ecomate® 时不需要复杂的混合设备、乳化设备或搅拌机。

处理产品前须仔细阅读 ecomate® 材料安全数据表, 产品数据表及产品处理指南。Ecomate®可以贮存在小容器和大型散装型容器。小容器应存放在阴凉, 干燥, 通风良好的地方。不使用时应关闭贮存容器, 使用时应慢慢打开, 释放多余的压力。远离热源, 火花, 火焰或其它致燃源。在装卸及运输时须正确接地和封装。使用抗火花的工具, 只用于干燥氮气加压容器。请向Foam Supplies代表咨询处理散装货的各种方法。Ecomate®的化学稳定性极好, 与HCFC - 141b 类似, 但不应与强碱化合物或碱金属接触。聚氨酯配方的稳定性超过六个月。

FLAMMABILITY 可燃性

Data below is on neat blowing agent. Isocyanates and Polyols/Resins can be blended with ecomate® so the flash point is high enough to not require use of "red label."

以下是纯发泡剂的数据。异氰酸酯和多元醇/树脂可以混合使用ecomate®, 所以闪点足够高, 不需要使用“红色标签”。

Lower Flammable Limit 可燃下限 (Vol %)	5.0
Upper Flammable Limit 可燃上限 (Vol %)	23.0
Flash Point (closed cup) 闪点 (闭杯)	-19°C/-2°F
Auto Ignition Temp 自燃温度	465°C/869°F
Heat of Combustion 燃烧热 (kJ/g / BTU/lb)	-16.2/6965
Min Ignition Energy 最小自燃能量 (mJ / BTU)	0.5/4.74 x 10 ⁻⁷

TOXICITY 毒性

Long term evaluation of ecomate® has shown no toxic concerns. Ecomate® has achieved GRAS (Generally Recognized As Safe) Approval for use in domestic appliances. Ecomate® is registered with REACH (EINECS No. 203-481-7). Refer to the MSDS and Technical Data Sheet for more specific toxicology information.

根据长期评估证明 ecomate® 无毒性。Ecomate® 已经获得GRAS (一般公认安全) 批准用于家用电器。Ecomate® 是REACH (EINECS No. 203-481-7) 的注册化学品。具体的毒理学数据请参阅 MSDS 和产品数据表。

TLV (ACGIH) = 100 ppm
STEL (ACGIH) = 150 ppm
PEL (OSHA) = 100 ppm

<http://www.foamsupplies.com/resources/technical-documents/>

PACKAGING 包装

Ecomate® is available in the following containers. 可使用下列容器

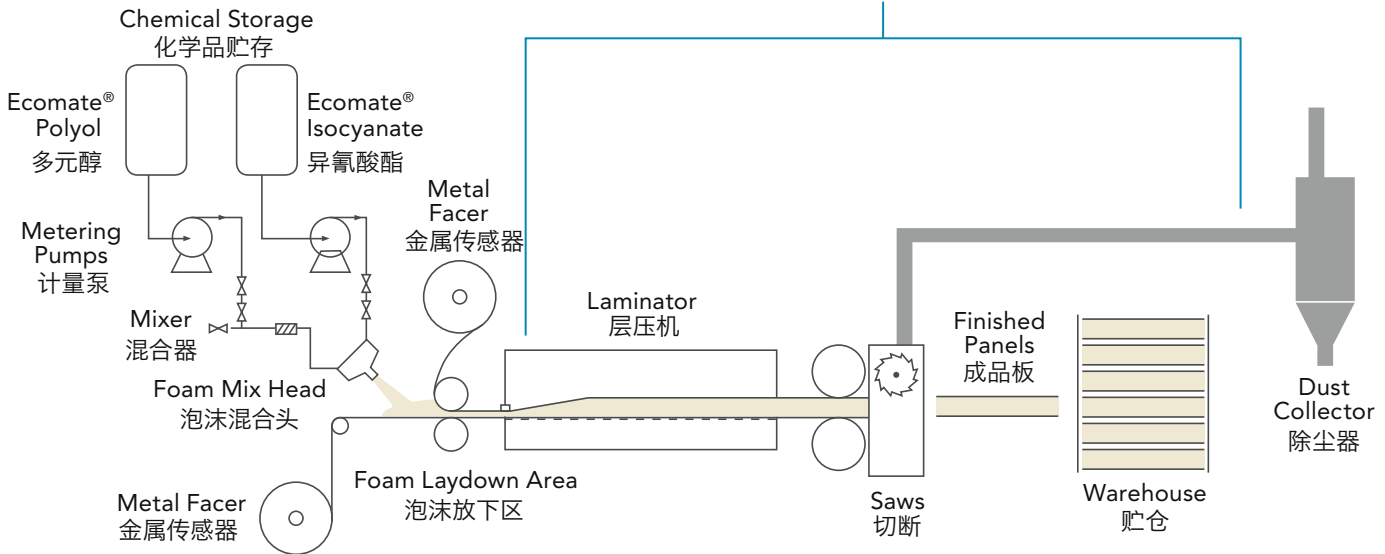


MANUFACTURING EMISSIONS 生产过程的排放

Because of its excellent solubility, ecomate® emissions are very low throughout the manufacturing processes, including “3rd-Stream” applications.

由于 ecomate® 的溶解性很好, 在整个生产过程中, 包括“三流”应用程序, 排放量都非常低。

Emissions are <100 ppm from the laminator to the warehouse
从层压到贮仓全过程排放量 <100 ppm



SPRAY FOAM EMISSIONS 泡沫喷涂过程中的排放

Spray Foams are “worst case” scenarios for emissions. Multiple third party emissions and hygiene testing on ecomate® spray systems have proven very favorable.

一般来说, 喷涂泡沫过程的排放往往是最糟糕的, 但多次第三方排放检测和卫生测试, 都证明 ecomate® 喷涂系统在排放方面表现出色。

Low Pressure injection equipment
低压注塑设备

Spray equipment sampling taken indoors
~61 cm (2 ft) from point of application
在室内距离喷涂点 61厘米 (2英尺) 处抽样

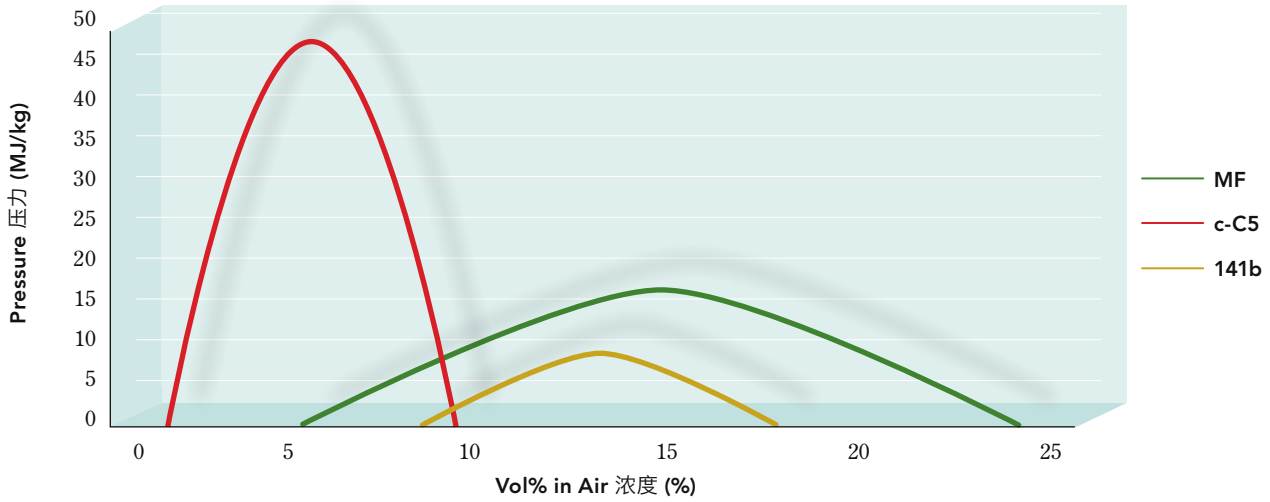
PPM at Injection point PPM (在注入点)	600 mm (23.62 in) from head 距离头部600毫米 (23.62英寸)	PPM over the foaming area PPM (喷涂表面)	At the spray head 在喷头处
2.85	0.59	23	10
3.00	0.71	23	12
2.95	0.73	20	10
2.26	0.63		

Sample Data below was taken from nominal 25–27 kg/m³ (1.56–1.69 lb/cu³) foam without use of ventilation. Ventilation is a requirement for use of isocyanates.

取得数据的标准环境条件: 喷涂泡沫 25 - 27 kg/m³ (1.56 - 1.69 lb/ft³), 未使用通风。异氰酸酯喷涂要求使用通风。

PRESSURE GRAPH 压力图

The burning of ecomate® gives off less pressure (is less explosive).
燃烧 ecomate® 时释放的压力较小 (不易爆炸)。



FLASH POINTS 闪点

Ecomate® systems have been reported and proven by multiple third party Testing Agencies to exhibit Flash Points well above 35°C/95°F per ASTM D93-02, thus not requiring “red label” via U.S. DOT regulations.
多个独立测试机构根据ASTM D93-02 进行测试，证明 Ecomate® 系统的闪点远高于规定的35°C(95°F)，因此根据 U.S. DOT规定，不需要“红色标签”。

COMBUSTION 燃烧

Ecomate® systems have been proven to not sustain combustion per ASTM D4206. This has been reported by multiple third party testing agencies.
Ecomate® 系统已被多个独立测试机构证明不会维持燃烧 (符合ASTM D4206)。

Koehler
INSTRUMENT COMPANY, INC.

To: Foam Supplies, Inc.
4337 North Rider Trail
Earth City, MO 63045-1103
ATTN: Mark Schulte
TEL: 314-344-3330
FAX: 314-344-3331

The following liquid samples were sent in for Pensky-Martens Closed Cup Flash Point tests (D93) by Foam supplies, Inc. on August 4, 2009. The samples were tested and the results are filed.

Sample ID	Initial Dip (°F)	First Dip (°F)	Flash Point (°F)	Comments
I	68	70	73	Not true flash point, vapor may due to stirring
J	66	68	80	Not true flash point, vapor may due to stirring
K	66	68	109	
L	68	70	152	
M	66	68	141	
N	68	70	189	
O	68	70	127	
P	68	70	117	

Based on customer's requirement, the tests were performed using ASTM D93, the Standard Test Method for Flash point by Pensky-Martens Closed Cup Tester, procedure A. The instrument used is manufactured by Koehler Instruments Co. with part number K18200, PMCC Tester, 115V, with serial number RE1091350.

The tests started at Room temperature, which is around 66-68 °F. Due to low flash point of the samples, flame was applied before the heating and stirring started for each sample test to insure none of them flashes at room temperature.

Selina Shi
Application and Testing Engineer

Date: 8/7/09

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Phoenix Chemical Laboratory, Inc.
FUEL AND LUBRICANT TECHNOLOGISTS
393 SHAKESPEARE AVENUE
CHICAGO, ILL. 60647-3497

May 15, 2002

RECEIVED FROM Foam Supplies, Inc.
4387 North Rider Trail
Earth City, MO 63045-1103
Attn: Mark Schulte

SAMPLE OF System 01B24 Part B

LABORATORY NO. 02 5 9 12

MARKED

Sustained Combustibility (ASTM D4206)
Triplicate Determinations

Target Flash Point, 120°F
(119°F after correction for barometric pressure)
Heating Time: 60 seconds

- 1) No ignition, sustained combustion or flashing before test flame moved into the test position.
- 2) No ignition, sustained combustion or flashing while the test flame was in the test position for 15 seconds and returned to off position.

Arthur A. Krawetz

ECONOMIC EFFICIENCY 经济效益

In general, it takes the same molar concentration of any blowing agent to blow the same density of foam. There are however two potential mitigating factors of the blowing agent: high volatility (low boiling point temperature) and poor solubility. Both factors will cause more of the blowing agent to escape. Ecomate® combats effects of these factors through its low volatility and high solubility.

Ecomate® has excellent solubility in most polyols and in both sides of A+B systems. It is also soluble with most other blowing agents including HCFC, HFC and HCs. By blending it with the various products available it is easy to customize your product design.

The chart below illustrates how ecomate® uses less material, and is less expensive at equal density.

在一般情况下, 采用相同摩尔浓度的任何发泡剂加工出相同密度的泡沫。然而一般的发泡剂有两个缺点: 挥发性高(沸点低)和溶解度差。这两个缺点都会导致更多的发泡剂逸出。Ecomate® 却因拥有低挥发性和高溶解度的特性而不会出现这种不利情况。

Ecomate® 在大多数多元醇及A+B系统两侧都具有良好的溶解性, 也溶于大多数发泡剂(例如HCFC, HFC和HC)。由于可与各种材料混合, 所以很容易应用于你的产品。

下表说明如何使用较少的ecomate® 材料, 以较低的价钱, 生产出同等密度的产品。

Blowing Agent 发泡剂	Relative Price / Weight ¹ 相对价格 ¹	MW 分子量	Weight Factor ² 重量因子 ²	Relative Cost to Ecomate® ³ 相对于Ecomate® 的成本 ³
Ecomate®	**	60	Ref 基准	Ref 基准
HCFC-141b	**	117	1.95	1.95
HFC-245fa	*****	134	2.23	7.82
HFC-365/227	*****	149	2.48	9.44
n-C5	**	72	1.20	1.20
c-C5	**	70	1.17	1.46

¹ Relative Price per unit of weight [ie, \$/lb or €/kg].

² Wt Factor [MW/60] illustrates extra blowing agent necessary for same density foam.

³ Cost relative to ecomate® for same density of foam

¹ 相对价格(单位重量价格)(例如美元/磅, 欧元/公斤)

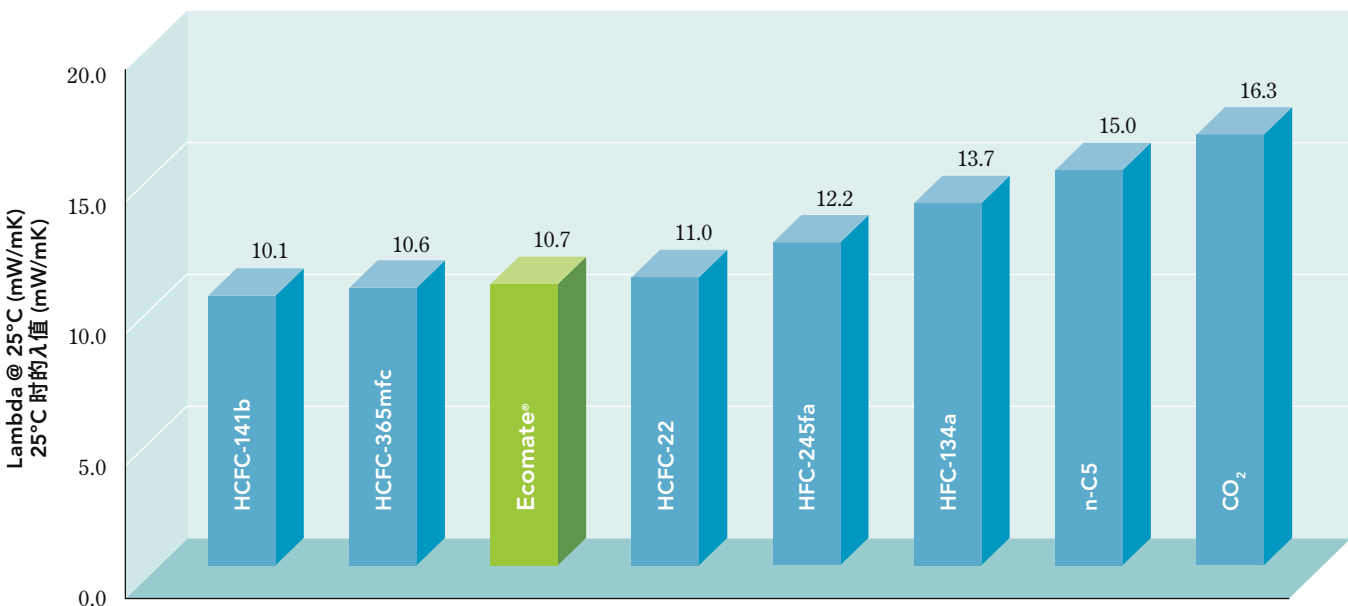
² 重量因子[MW/60]: 生产相同密度的泡沫需要多少额外的发泡剂

³ 生产相同密度的泡沫的成本(相对于 ecomate®)

THERMAL EFFICIENCY 热效率

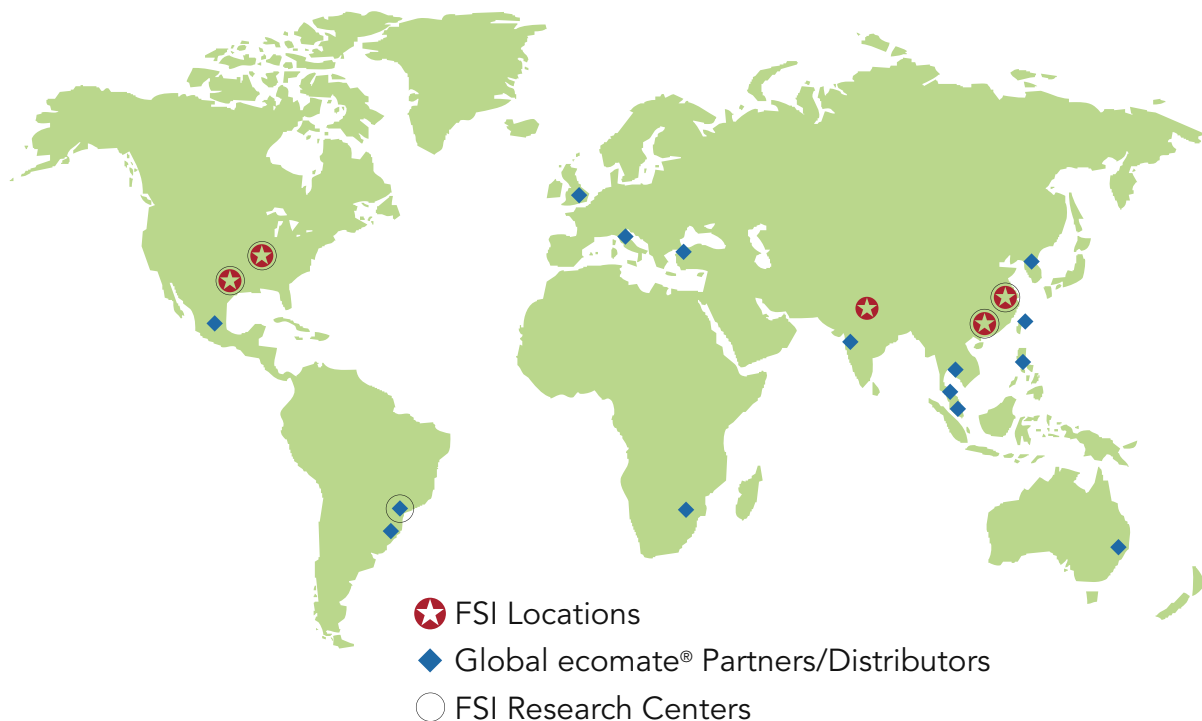
The low lambda value of neat ecomate® allows production of foams with excellent thermal efficiency. In various side by side comparison tests against 141b products, ecomate® has proven to perform nearly the same. FSI recommends end product, side by side comparison to eliminate deceiving or inaccurate reported lab results.

纯 ecomate® 的λ值低, 因此能以优良的热效率生产泡沫产品。对 ecomate® 和141b 产品进行各种对比测试, 结果几乎相同。FSI 公司建议对最终产品进行对比测试, 以免受假像或不准确的数据所误导。



ecomate® Systems and Blowing Agent
are in Use Around the World

ecomate® 系统料和发泡剂在全球广泛应用



Ecomate® is available worldwide through our network of global partners. For a complete list, visit ecomatesystems.com or scan the code at right.

Ecomate® 在世界各地均可通过我们的全球合作网络获得。如需详细资料，请访问 ecomatesystems.com 或扫描右侧二维码。



Scan this code on your smartphone using a QR reader app.

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