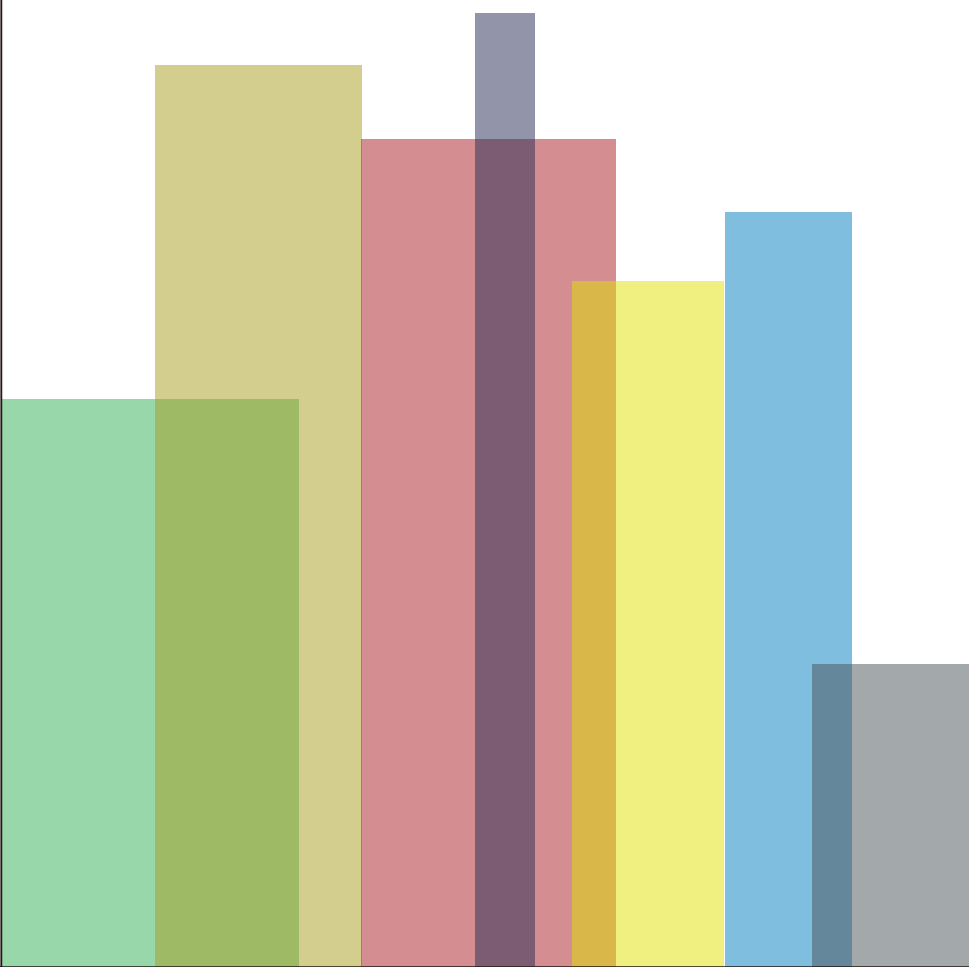




**Eternal Chemical**

# Epoxy Vinyl Ester Resins

長興環氧乙烯酯樹脂



ETERNAL CHEMICAL CO., LTD  
SINCE 1964  
長興化學工業股份有限公司  
<http://www.eternal-group.com>

# Epoxy Vinyl Ester Resins

## 內容 (Contents)

長興公司簡介(Introduction of Eternal Chemical Co., Ltd.) 02

---

一、乙炔酯樹脂特性(General properties of vinyl ester resin) 03

1、合成原理 Component 03

2、特長 Performance 03

3、樹脂類型 Specifications 04

4、物理性能 Typical physical properties 05

---

二、貯存注意事項(Storage and safety) 06

---

三、ETERSET 2960 膠化時間表(Gel time table of ETERSET 2960) 06

(1) Cobalt / MEKPO system 06

(2) DMA / BPO system 07

---

四、乙炔酯樹脂用途(Applications) 07

---

五、乙炔酯樹脂耐化性表(Chemical resistance guide) 08

A → 08	M → 17
B → 09	N → 17
C → 10	O → 18
D → 12	P → 18
E → 13	Q → 20
F → 14	S → 20
G → 14	T → 22
H → 15	U → 23
I → 16	V → 24
J → 16	W → 24
K → 16	X → 24
L → 16	Z → 24

---

# 長興公司簡介 Introduction of Eternal Chemical Co., Ltd

長興公司自1964年創業迄今，歷史悠久，躋身世界頂尖樹脂製造廠家之一。

- 1990,1992年分別榮獲全國工業總會---績優廠商之新產品開發獎。
- 1993年榮獲經濟部產業科技發展獎之優等獎。
- 1994年榮獲經濟部產業科技發展獎之傑出獎並通過法國 BVQI ISO9002認證。
- 1995年通過商檢局及法國 BVQI ISO9001認證。
- 1997年榮獲全國工業總會---績優廠商之新產品開發獎。
- 1999年通過 BVQI ISO14001國際環境品質認證。
- 2001年榮獲第九屆經濟部產業科技發展最高榮譽---卓越成就獎。
- 2007年榮獲經濟部台灣奈米技術產業發展協會之第三屆奈米產業科技菁英獎。
- 2008年榮獲台灣化學科技產業協進會2008年台灣化學科技產業菁英獎暨產品創新獎之產業貢獻獎，並榮獲經濟部頒發「創業四十年以上歷史悠久廠商」。



1964 Eternal Chemical Co. Ltd. established in Kaohsiung, Taiwan with capital of NTD 800,000.

- 1990 & 1992 Best performance manufacturer on new product R&D for Specialty Monomer products.
- 1993 Outstanding Award for Industrial Technology Advancement granted by MOEA.
- 1994 Approved ISO9002 BVQI Certificate.
- 1995 Approved ISO9001 BVQI Certificate.
- 1997 Joint venture with DSM Resins BV and DSM Eternal Resins (Kunshan) Co., Ltd. established.
- 1999 Approved ISO14001 BVQI Certificate
- 2001 Distinguished Award for Industry Technology Advancement, the highest honor granted by Ministry of Economic Affairs, Taiwan, R.O.C..
- 2007 Award Innovation Elite Prize of Taiwan nanotechnology (Industry Award) by Taiwan Nanotechnology Industry Development Association.
- 2008 Awarded " Long-Standing Enterprise for 40-year upward " by Ministry of Economic Affairs, R.O.C.

## 一、乙烯酯樹脂特性 General properties of Vinyl ester resins

### 1、合成原理 Component

乙烯酯樹脂是利用環氧樹脂與甲基丙烯酸進行酯化反應，最後以苯乙烯稀釋，它是具有環氧樹脂優良的耐化性、機械物理性能及不飽和聚樹脂優良之操作性，對於大部份酸、鹼、鹽的環境下具有良好的耐蝕性。

Eternal vinyl ester resins are low viscosity, non-promoter, based on epoxy resin and it provide good mechanical properties and high heat distortion temperature and provide resistance to a wide range of acids, alkalis, bleaches and solvents for use in many chemical processing applications.

### 2、特長 Performance

- 1). 具優越之玻纖含浸性。
- 2). 機械强度高。
- 3). 較高之斷裂延伸率。
- 4). 高熱變性溫度。
- 5). ETERSET 2960 經過適當處理可符合美國聯邦法規之藥物暨食品管理 (FDA)所規定之測試方法(CFR 177.2420)。
- 6). ETERSET 2960 通過挪威驗船協會(DNV)第二級。
- 7). ETERSET 2967 不需要額外加入阻燃劑製成的積層板即可達到ASTM E84 A級，UL 94 V-0，氧指數42等效果。
- 8). ETERSET 2968 具有高耐衝擊強度、高延伸率、優良的金屬/塑膠/FRP 間黏著力。

- 1) Offers good wet-out.
- 2) Provide superior toughness.
- 3) Better elongation.
- 4) High heat deflection temperature.
- 5) ETERSET 2960 complies with FDA regulation 21 CFR 177.2420 when treated well.
- 6) ETERSET 2960 has been registered approval for marine by DNV.
- 7) Laminates of the resin ETERSET 2967 can achieve ASTM E84 A class, OI 42, UL-94 V-0 without any additives.
- 8) ETERSET 2968 possesses high impact strength, high elongation and excellent adhesion between metal/plastic/FRP.



## 4、物理性能 Typical physical properties

### 1)、純樹脂注型片物性 Typical properties of clear casting :

品名 (Product)	ETERSET 2960	ETERSET 2962	ETERSET 2967	ETERSET 2968
抗張強度 Tensile Strength, MPa(ASTM D638)	80-90	70-80	70-80	50-60
抗張模數 Tensile Modulus, GPa(ASTM D638)	3.3-3.6	3.4-3.7	3.3-3.5	2.2-2.5
伸長率 Tensile Elongation, %(ASTM D638)	5.0-6.0	2.5-3.5	2.5-3.5	8.0-10.0
抗折強度 Flexural Strength, MPa (ASTM D790)	140-150	120-130	125-135	120-130
抗折模數 Flexural Modulus, GPa (ASTM D790)	3.4-3.6	3.4-3.7	3.3-3.5	3.2-3.4
熱變形溫度 Heat Deflection Temperature, °C (ASTM D648)	105	140-150	125-135	65-70

### 2)、積層板物性(3±0.2mm厚手積層板，30±2% 玻纖含量)

Typical properties of Laminates (Hand lay-up 3±0.2mm and 30±2% glass content)

品名 (Product)	ETERSET 2960	ETERSET 2962	ETERSET 2967
抗張強度 Tensile Strength, MPa(ASTM D638)	95-105	80-90	80-90
抗張模數 Tensile Modulus, GPa(ASTM D638)	8.0-9.0	7.0-8.0	7.0-8.0
伸長率 Tensile Elongation, %(ASTM D638)	1.6-1.8	1.4-1.6	1.4-1.6
抗折強度 Flexural Strength, MPa (ASTM D790)	160-170	150-160	155-165
抗折模數 Flexural Modulus, GPa (ASTM D790)	7.0-8.0	6.0-7.0	6.0-7.0

### 3)、黏結度 Adhesion strength

ASTM D1002 Kgf/cm2	碳鋼 Carbon steel	不鏽鋼 Stainless steel	UP灌注FRP板 UP laminate
ETERSET 2968	90-95	120-125	70-75

## 二、貯存注意事項 Storage and Safety

溫度低於25°C之一般貯存時間，為6個月，其貯存時間隨運輸條件溫度升高而縮短，應遠離熱源如日光直接照射，蒸氣管等，若久置不用需打開瓶蓋打入空氣，如此可增加儲存時間。

Typical storage life at temperature below 25°C is 6 months. Storage life decreases with increasing temperature. Avoid exposure to heat sources such as direct sunlight or steam pipes. If resin is not used for a long time, to periodically open the bung of drum to let fresh air go into the resin can extend the resin's shelf life.

## 三、ETERSET 2960 膠化時間表 Typical gel time of ETERSET 2960

不同溫度下促進劑、DMA及硬化劑添加量會造成樹脂膠化時間有所不同，以下表格僅供參考，因促進劑及硬化劑之供應商不同亦會有不同的結果，建議使用前先取100克樹脂依所需時間添加所需之促進劑、DMA及硬化劑，若不同則請自行調整添加劑之比例。

The gel time of ETERSET 2960 may vary due to using different Cobalt and MEKPO from different makers, so before formulating large quantities, testing a small quantity about 100 grams is strongly recommended.

### (1) Cobalt / MEKPO system

溫度 Temp.	促進劑及硬化劑 Promoter & Hardener	10-20(分) 10-20 min.	20-40(分) 20-40 min.	40-60(分) 40-60 min.
15°C	Cobalt (6%)	0.3%	0.3%	0.3%
	DMA (100%)	0.1%	0.03%	0.01%
	MEKPO (55%)	1.0%	1.0%	1.0%
20°C	Cobalt (6%)	0.3%	0.3%	0.3%
	DMA (100%)	0.05%	0.02%	0.005%
	MEKPO (55%)	1.0%	1.0%	1.0%
25°C	Cobalt (6%)	0.3%	0.3%	0.2%
	DMA (100%)	0.03%	0.01%	0%
	MEKPO (55%)	1.0%	1.0%	1.0%
30°C	Cobalt (6%)	0.3%	0.3%	0.3%
	DMA (100%)	0.02%	0%	0%
	MEKPO (55%)	1.0%	1.0%	0.8%

## (2) DMA / BPO system

溫度 Temp.	促進劑及硬化劑 Promoter & Hardener	10-20(分) 10-20 min.	20-40(分) 20-40 min.	40-60(分) 40-60 min.
10°C	DMA (100%)	1.0%	0.5%	0.25%
	BPO (50%)	4.0%	4.0%	4.0%
15°C	DMA (100%)	0.6%	0.3%	0.2%
	BPO (50%)	4.0%	3.0%	3.0%
20°C	DMA (100%)	0.4%	0.35%	0.2%
	BPO (50%)	3.0%	2.0%	2.0%
25°C	DMA (100%)	0.25%	0.3%	0.15%
	BPO (50%)	3.0%	2.0%	2.0%

## 四、乙酯樹脂用途 Applications

<b>防腐蝕FRP</b> <b>Chemical resistant of tank or pipe</b>	化學藥品儲存槽(Raw material tank) 、 電解槽(Electrolytic tank) 、 食品級桶槽(Storage tank) 、 排氣管(Vent Pipe) 、 排煙管(Desulphurization equipment)
<b>防蝕內襯</b> <b>Anti-corrosion lining</b>	石油儲槽內襯(Crude oil tank) 、 污水處理池內襯(Waste water treatment) 、 游泳池內襯(Swimming pool) 、 廢液處理池內襯(Processing equipment) 、 溫泉SPA池內襯(Hot spring pipe)
<b>高強度FRP</b> <b>High-performance composite</b>	遊艇(Yacht) 、 風力葉片(Windmill Blade)



## 五、乙烯酯樹脂耐化性表 Chemical resistance guide of vinyl ester resins

(以英文字母順序排列) (In alphabetical order)

在以下的耐化性表中，某些化學品右上角標有1至6不同數字，其需注意事項如下：

1. 兩層有機表面纖維蓆。
2. 兩層玻璃表面纖維蓆。
3. 5mm 耐化學層。
4. 耐化學層使用耐酸玻璃纖維。
5. 建議使用BPO/DMA系統硬化。
6. 建議後固化。

另外在耐化性表中之NR表示不建議使用。

1. Double synthetic veil has to be used.
2. Double glass veil has to be used.
3. 5mm thick chemical layer
4. Acid resistant glass has to be used in chemical resistant barrier
5. Benzoyl peroxide/Amine cure system is recommended.
6. Post-cure is recommended.

NR : Not Recommended

Chemicals	濃度(%) Concentration	Maximum Service Temp.(°C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Acetaldehyde (乙醛)	All	NR	NR	NR
Acetic acid (乙酸)	0-25	100	100	100
	25-50	80	80	80
	50-75	65	65	65
	75-85	40	45	45
	100	NR	40	NR
Acetic anhydride (乙酐; 醋酸酐)	100	NR	40	NR
Acetone (丙酮)	100	NR	NR	NR
Acrylic acid (丙烯酸)	25	40	40	40
Acrylonitrile (丙烯腈)	100	NR	NR	NR
Adipic acid (己二酸)	All	80	80	80
Allyl chloride (氯丙烯)	All	25	25	25
Allyl alcohol (烯丙醇)	All	NR	25	NR

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Alum (明礬)	All	100	120	100
Aluminum chloride (氯化鋁)	All	100	120	100
Aluminum fluoride (氟化鋁)	All	25	25	25
Aluminum hydroxide (氫氧化鋁)	All	80	95	80
Aluminum nitrate (硝酸鋁)	All	100	100	100
Aluminum potassium sulfate (硫酸鋁鉀)	All	100	120	100
Ammonia gas (氨氣)	100	40	40	40
Ammonia liquid (液態氨)	100	NR	NR	NR
Ammonium acetate (醋酸銨)	All	25	40	25
Ammonium bicarbonate (重碳酸銨)	0-50	70	70	70
Ammonium bisulfite(重硫酸銨)	All	65	65	65
Ammonium carbonate (碳酸銨)	All	65	65	65
Ammonium chloride (氯化銨)	All	100	100	100
Ammonium citrate (檸檬酸銨)	All	65	65	65
Ammonium fluoride <sup>1</sup> (氟化銨)	All	65	65	65
Ammonium hydroxide <sup>1</sup> (氫氧化銨)	0-5	80	80	80
	6-20	65	65	65
	20-30	40	40	40
Ammonium nitrate (硝酸銨)	All	100	120	100
Ammonium persulfate (高硫酸銨)	All	100	100	100
Ammonium phosphate (磷酸銨)	All	100	100	100
Ammonium sulfate (硫酸銨)	All	100	120	105
Amyl acetate (乙酸戊酯)	All	NR	50	NR
Aniline (苯胺)				
Aniline hydrochloride (氫氯苯胺)	All	NR	35	NR
Aniline sulfate (硫酸苯胺)	All	85	85	85
Arsenious acid (亞砷酸)	All	100	100	100
Barium acetate (醋酸鋇;乙酸鋇)	All	80	80	80
Barium carbonate (碳酸鋇)	All	100	100	100
Barium chloride (氯化鋇)	All	100	100	100
Barium hydroxide <sup>1</sup> (氫氧化鋇)	All	65	65	65

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Barium sulfate (硫酸鋇)	All	100	120	100
Barium sulfide (亞硫酸鋇)	All	80	80	80
Beer (啤酒)		50		
Benzaldehyde (苯甲醛)	100	NR	NR	NR
Benzene (苯)	100	NR	40	NR
Benzene sulfonic acid (苯磺酸)	50	65	65	65
Benzoic acid (苯甲酸)	All	100	100	100
Benzyl alcohol (苯甲醇)	100	NR	40	NR
Benzyl chloride (苯甲氯)	100	NR	25	NR
Black liquor recovery,(Furnace gasses) (煙囪氣)		165	205	165
Brass plating solution <sup>1</sup> (鍍黃銅液) (3% Copper cyanide,6% Sodium cyanide, 1% Zinc cyanide,3% Sodium carbonate)		80	80	80
Boric acid (硼酸)	All	95	95	95
Bromine(liquid) (溴),液體		NR	NR	NR
Bromine water (溴水)	5	80	80	80
Bronze plating solution <sup>1</sup> (鍍銅液) (4% copper cyanide, 5% sodium cyanide, 3% sodium carbonate, 4.5% Rochelle salts)		80	80	80
Butyl acetate (醋酸丁酯)	All	NR	30	NR
Butyl alcohol (丁醇)	100	50	50	50
Butylaldehyde (丁醛)	100	NR	35	NR
Butyl benzoate (苯甲酸丁酯)	100	NR	35	NR
Butyl cellosolve (乙二醇單丁醚)	100	40	40	40
Butylene glycol (丁二醇)	100	70	80	70
Butyric acid (酪酸)	0-50	100	100	100
	100	25	50	25
Cadmium chloride (氯化鎘)	All	90	90	90
Cadmium cyanide plating solution <sup>1</sup> , (氯化鎘) (3% Cadmium oxide,10% Sodium cyanide, 1% Sodium hydroxide)		80	90	80
Calcium chlorate (氯酸鈣)	All	100	100	100
Calcium chloride (氯化鈣)	All	100	120	100

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Calcium hydroxide <sup>1</sup> (氫氧化鈣)	All	90	100	90
Calcium hypochlorite <sup>1,5,6</sup> (次氯酸鈣)	All	81	39	81
Calcium nitrate (硝酸鈣)	All	100	100	100
Calcium sulfate (硫酸鈣)	All	100	120	100
Calcium sulfite (亞硫酸鈣)	All	100	100	100
Cane sugar liquor & sweet water (蔗糖液 和 糖水)	All	80		
Caprylic acid (癸酸)	100	80	100	80
Carbolic acid (石炭酸)	>5	NR	25	NR
Carbon dioxide gas, dry (二氧化碳,乾式氣體)		165	205	165
Carbon monoxide gas, dry (一氧化碳,乾式氣體)		165	205	165
Carbon tetrachloride (四氯化碳)	100	65	80	65
Carbonic acid (碳酸)	All	70	70	70
Castor oil (蓖麻油)	100	75	75	75
Chlorinated waxes (氯化石蠟)	100	80	80	80
Chlorine,(liquid) (液態氯)		NR	NR	NR
Chlorine Dioxide <sup>1,5,6</sup> ,Chlorine (二氧化氯,含氯氣)	All	79	95	89
Chlorine Dioxide <sup>1,5,6</sup> ,No Chlorine (二氧化氯,不含氯氣)	All	79	95	89
Chlorine Dioxide,Solution (二氧化氯液體)	Sat'd	19	19	19
Chlorine gas, dry <sup>3,6</sup> (氯氣,乾式)	100	100	120	105
Chlorine gas, wet <sup>3,6</sup> (氯氣,濕式)	100	100	120	105
Chloroform (氯仿;三氯甲烷)	100	NR	NR	NR
Chrome plating bath <sup>1</sup> (渡鉻液) (19% Chromic acid with sodium fluorosilicate and sulfate)		50	64	50
Chromic acid(鉻酸)	0-10	64	64	64
	10-20	50	64	64
	20-30	NR	NR	NR
Citric acid (檸檬酸)	All	100	100	100
Coconut fatty acid (椰子脂肪酸)	100	90	90	90
Coconut oil (椰子油)	100	100	100	100
Copper chloride (氯化銅)	100	99	120	106
Copper cyanide <sup>1</sup> (氰化銅)	All	100	100	100

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Corpper nitrate(硝酸銅)	All	100	100	100
Copper Cyanide Plating Bath (鍍銅液) (10.5% Copper and 14% Sodium cyanides, 6% Rochelle salts)		71	71	71
Copper Matte Dipping Bath <sup>2,3,4</sup> (30% Iron(III) chloride,19% Hydrochloric acid)		81	94	94
Copper plating solution <sup>1</sup> (鍍銅液) (45% Copper(II) tetrafluoroborate hexahydrate, 19% Copper sulfate, 8% Sulfonic)		80	100	80
Copper sulfate(硫酸銅)	Sat'd	99	120	99
Corn oil (玉米油)	100	90	100	90
Corn starch (玉米澱粉泥漿)	slurry	100		
Corn sugar (玉米糖)	All	100		
Cottonseed oil (棉子油)	100	100	100	100
Cresylic acids (甲酚)	All	NR	NR	NR
Crude oil, sour and sweet (原油,酸化&脫硫)	100	100	120	100
Cyclohexane (環己烷)	100	50	65	50
Decanol (decyl alcohol) (癸醇)	100	50	75	50
Detergents, sulphonated (磺化清潔劑)	All	100	100	100
Diallylphthalate (酞酸二丙烯酯)	All	75	95	75
Diammonium phosphate (磷酸二銨)	All	100	100	100
Dibromophenol (二溴酚)	100	NR	40	NR
Dibromopropanol. (二溴丙醇)	All	NR	40	NR
Dibutyl ether (二丁醚)	100	25	79	
Dichlorobenzene (二氯苯)	100	NR	50	NR
Dichloroethene (二氯乙烯)	100	NR	NR	NR
Dichloropropene (二氯丙烯)	100	NR	40	NR
Diesel fuel (柴油燃料)	100	85	100	85
Diethanol amine (二乙醇胺)	100	50	60	50
Diethyl amine (二乙基胺)	40	NR	NR	NR
Diethyl carbonate (碳酸二乙酯)	100	NR	40	NR
Diethyl ether (乙醚)	100	NR	NR	NR
Diethyl formamide (二乙基甲醯胺)	100	NR	NR	NR

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Diethyl ketone (二乙酮)	100	NR	NR	NR
Diethylene glycol (二乙二醇)	All	85	100	85
Diisopropanol amine (二異丙醇胺)	100	50	65	50
Dimethyl acetamide (二甲基乙醯胺)	100	NR	25	NR
Dimethyl amine (DMA) (二甲基胺)	100	NR	25	NR
Dimethyl formamide (DMF) (二甲基甲醯胺)	100	NR	25	NR
Dimethyl sulphate (硫酸二甲酯)	100	NR	NR	NR
Dimethyl sulphoxide (二甲基亞砜)	20	35	40	35
Dinonyl phthalate (酞酸二壬酯)	100	60	95	60
Dioxane (二氧環烷)	All	NR	NR	NR
Diphenyl ether (二苯醚)	100	NR	45	NR
Dipropylene glycol (二丙二醇)	All	85	100	85
Disodium hydrogenphosphate (磷酸氫二鈉)	10	85	100	85
Dodecanol (十二醇)	100	75	90	75
Epoxidized Castor oil (環氧化蓖麻油)	100	50	50	50
Epoxidized Soybean oil (環氧化大豆油)	100	65	65	65
Epoxy Resins - NPEL 128 (環氧樹脂)	100	40	40	40
Esters, Fatty acid (紙類, 脂肪酸)	100	85	85	85
Ethanol (= ethyl alcohol) (乙醇, 酒精)	10	50	65	50
	50	40	50	40
	100	NR	40	NR
Ethanol amine (乙醇胺)	100	26	39	26
Ethyl acetate (乙酸乙酯, 醋酸乙酯)	100	NR	24	NR
Ethyl acrylate (丙烯酸乙酯)	100	NR	24	NR
Ethyl amine (乙胺)	40	NR	40	NR
Ethyl benzene (乙苯)	100	25	50	25
Ethyl bromide. (溴化乙烷)	100	NR	NR	NR
Ethyl chloride (氯化乙烷)	100	NR	24	NR
Ethylene chlorohydrin (氯乙醇)	100	39	39	39
Ethylene glycol (乙二醇)	100	100	100	100
Ethyl ether (乙醚)	100	NR	NR	NR

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Ethyl sulphate (硫酸乙酯)	100	30	40	30
Fatty acid esters (脂肪酸酯)	100	85	95	85
Fatty acids (脂肪酸)	All	100	120	100
Ferric chloride (III) (三氯化鐵)	All	100	100	100
Ferric nitrate (硝酸鐵)	All	100	100	100
Ferric sulphate (硫酸鐵)	All	100	100	100
Ferrous chloride (II) (氯化亞鐵)	All	100	100	100
Ferrous sulphate (硫酸亞鐵)	All	100	100	100
Fertiliser Uran (Uran 肥料)		64	64	64
8-8-8 Fertiliser, (肥料)		64	64	64
Flue gas (煙氣),dry	All	160	200	160
Flue gas (煙氣),wet	All	80	100	80
Fluoboric acid <sup>1</sup> (氟硼酸)	All	99	100	99
Fluorine gas <sup>1</sup> (氟氣體)		NR	NR	NR
Formaldehyde (甲醛)	All	51	65	51
Formamide (甲酰胺)	100	NR	NR	NR
Formic acid (甲酸,蟻酸)	10	81	81	80
	50	49	49	49
Fuel oil (燃料油)	100	80	100	80
Gasoline, Aviation (汽油)	100	81	81	81
Gasoline, Leaded (汽油)	100	81	81	81
Gluconic acid (葡萄糖酸)	50	80	80	80
Glucose (葡萄糖)	All	81		
Glutaraldehyde (戊二醛)	50	49	50	49
Glutaric acid (戊二酸)	50	49	50	49
Glycerine (丙三醇,甘油)	100	100	100	100
Glycerine triacetate (三醋酸甘油酯)	All	25	25	25
Glycolic acid (乙醇酸)	35	60	60	60
	70	40	40	40
Glyoxal (乙二醛)	40	40	40	40

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Gold Plating Solution (渡金液) (23% Potassium ferrocyanide with Potassium gold cyanide and Sodium cyanide)		99	99	99
Heptane (庚烷)	100	85	95	85
Heptene (庚烯)	100	85	95	85
Hexane (己烷)	100	69	69	69
Hexanediol (己二醇)	All	80	80	80
Hydrazine (聯氨)	All	NR	NR	NR
Hydrazine hydrate (水合聯氨)	16	30	30	30
Hydrobromic acid <sup>4</sup> (氫溴酸)	0-25	81	81	81
	25-50	64	64	64
	50-60	39	39	39
Hydrochloric acid <sup>2,3,4</sup> (氫氯酸, 鹽酸)	<20	81	111	101
	20-37	64	81	64
Hydrochloric acid fumes <sup>2,3,4</sup> (鹽酸煙霧)		95	170	95
Hydrocyanic acid (氫氰酸)	All	100	100	100
Hydrofluoric acid <sup>1,6</sup> (氫氟酸)	10	65	65	65
	20	40	40	40
	30	NR	NR	NR
Hydrofluosilicic acid <sup>1</sup> (氫氟矽酸)	10	80	80	80
Hydrofluosilicic acid fumes <sup>1</sup> (氫氟矽酸煙霧)	10	70	70	70
Hydrogen bromide, dry gas (溴化氫氣體)	100	80	95	80
Hydrogen bromide, wet gas (溴化氫氣體)	100	80	80	80
Hydrogen chloride, dry gas <sup>4</sup> (氯化氫氣體)	100	100	175	100
Hydrogen chloride, wet gas <sup>4</sup> (氯化氫氣體)	100	100	110	100
Hydrogen fluoride, vapor <sup>1</sup> (氟化氫)		79	79	79
Hydrogen peroxide <sup>5,6</sup> (過氧化氫, 雙氧水)	<30	65	65	65
Hydrogen sulphide, aqueous (硫化氫水溶液)	All	99	100	99
Hydrogen sulphide, gas (硫化氫氣體)	100	99	109	99
Hydroxybenzenesulfonic acid (氫氧苯磺酸)	All	60	60	60
Hypochlorous acid <sup>5,6</sup> (次氯酸)	10	40	40	40
Hypophosphorous acid (次磷酸)	50	50	50	50



Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Iron plating solution (鍍鐵溶液) 45% Iron(II) chloride,15% Calcium chloride, 20% Iron(II) sulfate,11% ammonium sulfate		81	101	81
Iron & steel cleaning bath, (鋼鐵清洗槽) 9% Hydrochloric,23% Sulfuric acid		81	101	81
Isononyl alcohol (異壬醇)	100	60	60	60
Isopropyl alcohol(異丙醇)	100	50	50	50
Isopropylamine (異丙胺)	All	40	40	40
Isopropyl myristate (十八酸異丙酯)	100	95	105	95
Isopropyl palmitate (十六酸異丙酯)	100	100	110	100
Isopropyl sulphate (硫酸異丙酯)	All	NR	NR	NR
Itaconic acid (丁烯二酸)	40	59	59	59
<b>Jet fuel (噴射燃料)</b>				
	100	80	80	80
<b>Kerosene (火油)</b>				
	100	80	80	80
<b>Lactic acid (乳酸)</b>				
	All	100	100	100
<b>Latex (乳膠)</b>				
	All	51	51	51
<b>Lauric acid (十二酸, 樟酸)</b>				
	100	100	100	100
<b>Lauroyl alcohol (月桂醯醇)</b>				
	All	85	85	85
<b>Lauryl ether sulphate (硫酸十二烷基醚)</b>				
	All	60	60	60
<b>Lauryl mercaptan (十二硫醇)</b>				
	All	85	85	85
<b>Lead acetate (醋酸鉛)</b>				
	All	99	109	99
<b>Lead chloride (氯化鉛)</b>				
	All	90	100	90
<b>Lead nitrate (硝酸鉛)</b>				
	All	100	100	100
<b>Levulinic acid (果糖酸)</b>				
	All	100	110	100
<b>Linseed oil (亞麻仁油)</b>				
	100	100	110	100
<b>Liquid sugar (液態糖)</b>				
	All	75		
<b>Lithium bromide (溴化鋰)</b>				
	All	100	120	100
<b>Lithium carbonate<sup>1</sup> (碳酸鋰)</b>				
	All	80	80	80
<b>Lithium chloride (氯化鋰)</b>				
	All	85	95	85
<b>Lithium sulphate (硫酸鋰)</b>				
	All	100	100	100

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Magnesium bicarbonate (重碳酸鎂)	All	80	80	80
Magnesium chloride (氯化鎂)	All	101	111	101
Magnesium nitrate (硝酸鎂)	All	90	100	90
Magnesium sulphate (硫酸鎂)	All	100	110	100
Maleic acid (順丁烯二酸,馬來酸)	All	90	100	90
Maleic anhydride (順丁烯二酸酐,馬來酸酐)	100	90	100	90
Manganous sulphate (硫酸錳)	All	85	95	85
Mercuric chloride (氯化汞)	All	100	100	100
Mercuric nitrate (硝酸汞)	All	90	90	90
Mercurous chloride (氯化亞汞)	All	100	100	100
Methacrylic acid (甲基丙烯酸)	25	40	50	40
Methane sulphonic acid (甲磺酸)	all	NR	35	NR
Methanol (= methyl alcohol) (甲醇)	5	50	50	50
Methoxyethylacetate (乙酸甲氧基乙酯)	100	NR	NR	NR
Methylaniline (甲苯胺)	100	NR	NR	NR
Methylcellosolve (甲基賽璐素)	100	NR	NR	NR
Methyldiethanolamine (甲基二乙醇胺)	100	50	50	50
Methylene bromide (二溴甲烷)	100	NR	NR	NR
Methylene chloride (二氯甲烷)	All	NR	NR	NR
Methyl Ethyl Ketone (甲乙酮)	100	NR	19	NR
Methyl Isobutyl Ketone (甲基異丁酮)	100	26	49	26
Methyl Methacrylate (甲基丙烯酸甲酯)	All	NR	26	NR
Milk and milk products (牛乳,牛乳產品)	All	70		
Mineral oils (礦油,石油)	100	100	120	100
Monochloroacetic acid (氯乙酸)	50	45	45	45
Monochlorobenzene (氯苯)	100	NR	35	NR
Monomethylhydrazine (甲基聯氨)	100	NR	NR	NR
Morpholine (1,4-氮氧環丁烷)	100	NR	NR	NR
Motor oil (馬達油)	100	101	121	101
Myristic acid (十四酸;肉豆蔻酸)	100	100	110	100
Naphtha, aliphatic (石油精,烷類)	100	80	100	80

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Neopentyl glycol (新戊二醇)	All	80	80	80
Nickel chloride (氯化鎳)	All	100	100	100
Nickel Plating Solution (鍍鎳液) (11% Nickel sulfate, 2% Nickel chloride, 1% boric acid)		79	79	79
Nickel Plating Solution (鍍鎳液) (44% Nickel sulfate, 4% Ammonium chloride, 4% boric Acid)		79	79	79
Nickel Plating Solution (鍍鎳液) (15% Nickel sulfate, 5% Nickel chloride, 3% Boric acid)		99	99	99
Nitric Acid <sup>6</sup> (硝酸)	0-5	65	80	65
	6-20	50	65	50
	21-30	40	50	40
	31-35	25	40	25
	> 35	NR	NR	NR
Nitrobenzene (硝基苯)	100	NR	40	NR
Nitrogen (氮氣)	100	100	200	100
Nitrogen tetroxide (四氧化二氮)	100	NR	NR	NR
Nitrous acid (亞硝酸)	10	NR	NR	NR
Nonanes (壬烷類)	100	80	100	80
Nonenes (壬烯類)	100	85	100	85
Octane (辛烷)	100	85	95	85
Octanoic acid (辛酸)	100	80	100	80
Octene (辛烯)	100	85	95	85
Oil, sour and sweet crude (酸化脫硫的油)	100	101	121	101
Oils (Grease, Lube, Vegetable) (潤滑油, 蔬菜油)	100	85	85	85
Oleic acid (油酸)	100	100	100	100
Olive oil (橄欖油)	100	100		
Orange oil (橙油)	100	80		
Oxalic acid(乙二酸)	All	50	50	50
Palm oil (棕櫚油)	100	90	100	90
Peanut oil (花生油)	100	85		

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Pentachloroethane (五氯乙烷)	100	NR	35	NR
Pentane (戊烷)	100	35	35	35
Pentanedioic acid (戊二酸)	All	55	75	55
Pentanol (戊醇)	100	50	65	50
Perchloric acid (過氯酸)	10	65	65	65
	30	40	40	40
Phenol (酚)	100	NR	NR	NR
Phenolsulphonic acid (酚磺酸)	All	NR	NR	NR
Phosphoric acid (磷酸)	100	100	100	100
Phosphorous acid (亞磷酸)	70	80	80	80
Phosphorous trichloride (三氯化磷)	100	NR	NR	NR
Phthalic acid (酞酸;鄰苯二甲酸)	All	100	100	100
Phthalic anhydride (酞酐;鄰苯二甲酸酐)	100	100	100	100
Picric acid (三硝基酚;苦味酸)	All	NR	40	NR
Pine oil (松油)	100	85	85	85
Polyethylene glycol (聚乙二醇)	All	85	95	85
Polymeric phosphoric acid (聚合磷酸)	100	85	95	85
Polyols (多元醇)	100	75	75	75
Polyvinyl acetate emulsion (醋酸乙烯酯聚合乳化液)	All	50	50	50
Polyvinyl alcohol (乙醇醇聚合物)	All	81	81	81
Potassium aluminium sulphate (硫酸鋁鉀)	All	100	120	100
Potassium bicarbonate (重碳酸鉀)	All	81	81	81
Potassium bromate (溴酸鉀)	All	90	90	90
Potassium bromide (溴化鉀)	All	99	99	99
Potassium carbonate <sup>1</sup> (碳酸鉀)	10	75	75	75
Potassium chlorate (氯酸鉀)	All	80	80	80
Potassium chloride (氯化鉀)	All	100	100	100
Potassium hydroxide <sup>1,6</sup> (氫氧化鉀)	0-25	65	26	65
Potassium iodide (碘化鉀)	All	60	60	60
Potassium nitrate (硝酸鉀)	All	100	100	100
Potassium nitrite (亞硝酸鉀)	All	100	100	100
Potassium oxalate (草酸鉀)	All	60	60	60

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Potassium persulphate (高硫酸鉀)	All	100	100	100
Propionic acid (丙酸)	0-20	90	90	90
	21-50	80	80	80
	51-100	NR	40	NR
Propylamine (丙基胺)	All	NR	NR	NR
Propylene glycol (丙二醇)	All	100	100	100
Pyridine (吡啶)	15	40	40	40
	100	NR	NR	NR
Quarternary ammonium salts (四配位銨鹽)	10	80	80	80
Salicylic acid (水楊酸)	All	70		
Selenious acid (亞硒酸)	All	100	100	100
Silicone oils or greases (矽酮油類或潤滑劑)	100	85	85	85
Silver nitrate (硝酸銀)	All	100	100	100
Silver Plating Solution <sup>1</sup> , (4% Silver; 7% Potassium, 5% Sodium cyanides, 2% Potassium carbonate)		81	66	81
Soaps (肥皂)	All	100	100	100
Sodium acetate (醋酸鈉)	All	100	100	100
Sodium aluminate <sup>1</sup> (鋁酸鈉)	All	71	49	71
Sodium bicarbonate (重碳酸鈉)	All	80	80	80
Sodium bifluoride <sup>1</sup> (二氟化鈉)	All	50	50	50
Sodium bisulphite (亞硫酸氫鈉)	All	100	100	100
Sodium bromate (溴酸鈉)	All	100	100	100
Sodium bromide (溴化鈉)	All	100	100	100
Sodium carbonate <sup>1</sup> (碳酸鈉)	All	80	65	80
Sodium chlorate (氯酸鈉)	All	100	100	100
Sodium chloride (氯化鈉)	All	100	100	100
Sodium chlorite (亞氯酸鈉)	15	65	65	65
Sodium chromate (鉻酸鈉)	All	100	100	100
Sodium cyanide <sup>1</sup> (氰化鈉)	All	100	100	100
Sodium dichromate (重鉻酸鈉)	All	100	100	100

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Sodium dihydrogenphosphate (磷酸二氫鈉)	All	80	80	80
Sodium diphosphate (重磷酸鈉)	All	100	100	100
Sodium ferric cyanide (氰化鐵鈉)	All	100	100	100
Sodium ferro cyanide (氰化亞鐵鈉)	All	100	100	100
Sodium fluoride <sup>1</sup> (氟化鈉)	All	80	80	80
Sodium hydroxide <sup>1</sup> (氫氧化鈉)	0-50	80	40	80
Sodium Hypochlorite <sup>1,5,6</sup> (次氯酸鈉)	0-5	65	50	65
	5-15	80	50	80
Sodium lauryl sulphate (硫酸十二酯鈉)	All	70	70	70
Sodium monophosphate (磷酸氫二鈉)	All	100	100	100
Sodium nitrate (硝酸鈉)	All	100	100	100
Sodium nitrite (亞硝酸鈉)	All	100	100	100
Sodium oxalate (草酸鈉)	All	95	95	95
Sodium polyacrylate (聚丙烯酸鈉)	All	80	80	80
Sodium sulphate (硫酸鈉)	All	100	100	100
Sodium sulphhydrate (流氫化鈉)	All	100	100	100
Sodium sulphide (硫化鈉)	All	100	100	100
Sodium sulphite (亞硫酸鈉)	All	100	100	100
Sodium tartrate (酒石酸鈉)	All	100	100	100
Sodium tetraborate (四硼酸鈉)	All	81	81	81
Sodium thiocyanate (硫氰化鈉)	All	81	81	81
Sodium thiosulphate (硫代硫酸鈉)	All	80	80	80
Sodium tridecylsulphate (硫酸十三酯鈉)	All	80	80	80
Sodium xylene sulphonate (二甲苯磺酸鈉)	All	71	71	71
Sorbitol solutions (山梨醇溶液)	All	70	80	70
Soy sauce (醬油)	All	70		
Soya oil (豆油)	100	100	100	100
Spearmint oil (薄荷油)	100	40		
Stannic chloride (氯化錫)	All	100	100	100
Stannous chloride (氯化亞錫)	All	100	100	100
Stannous sulphate (硫酸亞錫)	All	85	85	85
Stearic acid (硬脂酸；十八酸)	All	100	100	100

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Styrene (苯乙烯)	100	NR	50	NR
Succinic acid (丁二酸 ; 琥珀酸)	All	75	75	75
Sugar, Sucrose (蔗糖)	All	100		
Sulphamic acid (胺基磺酸)	10	99	99	99
	25	64	64	64
Sulphanilic acid (對胺基苯磺酸)	All	100	100	100
Sulphated detergents (硫化清潔劑)	All	71	81	71
Sulphur chloride (二氯化二硫)	All	NR	NR	NR
Sulphur dichloride. (二氯化硫)	All	NR	NR	NR
Sulphur dioxide(Flue gas),(二氧化硫)				
Sulphur trioxide gas, wet (濕式 三氧化硫氣體)	Fumes	99	149	99
Sulphuric acid <sup>4</sup> (硫酸)	0-50	99	99	99
	50-70	81	81	81
	71-75	39	81	39
	>75	NR	NR	NR
Sulfurous acid (亞硫酸)	10	50	50	50
Superphosphoric acid (過磷酸)	All	100	100	100
Tall oil (妥爾油)	100	95	105	95
Tannic acid (鞣酸)	All	100	100	100
Tartaric acid (酒石酸)	All	100	100	100
Tetrachloroethane (四氯乙烷)	100	35	50	35
Tetrachloroethene (四氯乙烯)	100	25	45	25
Tetrachloromethane (四氯甲烷)	100	25	45	25
Tetrapotassium pyrophosphate (焦磷酸鉀)	5	80	90	80
Tetrasodium ethylenediaminetetraacetate (乙二胺四醋酸鈉)	All	55	55	55
Tetrasodium pyrophosphate (焦磷酸鈉)	5	85	95	85
Thioglycolic acid (清硫基醋酸)	All	NR	40	NR
Thionyl chloride (亞硫醯氯)	100	NR	NR	NR
Tin Fluoborate Plating Bath <sup>1</sup> (鍍錫液) (18% Stannous fluoborate, 7% Tin, 9% Fluoboric acid, 2% Boric acid)		99	99	99

Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Toluene (甲苯)	100	25	50	25
Toluene diisocyanate (甲苯二異氰酸)	100	25	25	25
Toluene sulphonic acid (甲苯磺酸)	All	90	100	90
Transformer oils (Ester type oils) (轉化器油)	100	50	60	50
Transformer oils (Mineral oils)	100	100	145	100
Tributylamine (三丁基胺)	All	40	50	40
Tributyl phosphate (磷酸三丁酯)	100	50	60	50
Trichloroacetaldehyde. (三氯乙醛)	100	NR	NR	NR
Trichloroacetic acid (三氯乙酸)	50	39	39	39
Trichlorobenzene (三氯苯)	100	25	25	25
Trichloroethane. (三氯乙烷)		39	49	39
Trichloroethene. (三氯乙烯)	100	NR	NR	NR
Trichloromonofluormethane (三氯氟甲烷)	100	25	40	25
Trichlorophenol (三氯酚)	100	NR	NR	NR
Tricresyl phosphate (磷酸三對甲苯酯)	100	70	70	70
Tridecylbenzene sulphonate (磺酸十三烷基苯酯)	All	100	100	100
Triethanol amine (三乙醇胺)	100	50	64	50
Triethyl amine (三乙胺)	100	50	50	50
Triethylene glycol (三乙二醇)	100	85	85	85
Trimethyl amine (三甲胺)	100	25	25	25
Triphenyl phosphate (磷酸三苯酯)	100	55	55	55
Triphenyl phosphite (三苯磷)	100	60	60	60
Tripotassium phosphate (磷酸鉀)	All	60	50	60
Tripropyl amine (三丙胺)	All	35	45	35
Tripropylene glycol (三丙二醇)	All	90	100	90
Tritolyl phosphate (磷酸三一鄰甲苯酯)	All	65	65	65
Tung oil (桐油)	100	90	100	90
Turpentine (松節油)	All	65	99	65
Urea (尿素)	0-50	70	70	70



Chemicals	濃度(%) Concentration	Maximum Service Temp.( °C)		
		ETERSET 2960	ETERSET 2962	ETERSET 2967
Vegetable oils (植物油)	100	100	100	100
Vinegar (醋)	All	100	100	100
Vinyl acetate (醋酸乙烯酯)	100	NR	NR	NR
Vinyl chloride (氯化乙烯)	100	NR	NR	NR
Vinyl toluene (乙烯甲苯)	100	25	50	25
<b>Water</b>				
Water, Condensate (冷凝水)	100	90	90	90
Water, Deionized <sup>6</sup> (去離子水)	100	81	81	81
Water, Demineralized <sup>6</sup> (去礦物質水)	100	90	90	90
Water, Distilled (蒸餾水)	100	90	90	90
Water, Sea (海水)	100	81	81	81
<b>Xylene and Xylidine</b>				
Xylene (二甲苯)	100	25	50	25
Xylidine (= dimethyl aniline) (二甲基苯胺)	100	25	40	25
<b>Zinc Compounds</b>				
Zinc chlorate (氯酸鋅)	All	100	121	100
Zinc chloride (氯化鋅)	All	95	115	95
Zinc cyanide plating solution <sup>1</sup> (鍍鋅液) (9% Zinc cyanide, 4% Sodium cyanide, 9% Sodium hydroxide)		80	40	80
Zinc fluoborate plating bath <sup>1</sup> (鍍鋅液) (49% Zinc fluoborate, 5% Ammonium chloride, 6% Ammonium fluoborate)		93	93	93
Zinc nitrate (硝酸鋅)	All	100	120	100
Zinc sulphate (硫酸鋅)	All	100	121	100
Zinc sulphite (亞硫酸鋅)	All	90	100	90

本文所表述的資訊是準確可靠的，但不是作為保證。  
This corrosion guide is dependable for your reference only.

# Epoxy Vinyl Ester Resins

長興環氧乙烯酯樹脂



ETERNAL CHEMICAL CO., LTD  
長興化學工業股份有限公司

■ 長興化學工業股份有限公司 ETERNAL CHEMICAL CO., LTD.

總公司:高雄市三民區建工路578號

電話:07-3838181 傳真:07-3858622

578, Chienkung Road, Kaohsiung 807, Taiwan, R.O.C.

Tel: +886-7-3838181 Fax: +886-7-3858622

<http://www.eternal-group.com>

■ 長興合成樹脂(常熟)有限公司 ETERNAL SYNTHETIC RESINS (CHANGSHU) CO., LTD.

上海辦事處:上海市田林路388號新業大樓12層

電話:021-5490-2200 傳真:021-5490-2389

Floor 12 Xinye Building, No.388 Tianlin Road, Shanghai, China

Tel: +86-21-5490-2200 Fax: +86-21-5490-2389

<http://www.eternal-up.com>

■ 長興化學工業(廣東)有限公司 ETERNAL CHEMICAL (GUANGDONG) CO., LTD.

廣州分公司: 廣州市天河區華夏路28號富力盈信大廈2212室

電話: +86-20-8560 8003 傳真: +86-20-8560 8005

Room 2212, Fuli Building, No.28 Huaxia Road, Tianhe District, Guangzhou

Tel: +86-20-8560 8003 Fax: +86-20-8560 8005