



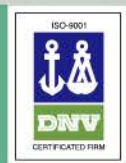
# Vinyl Ester Resins

**SWANCOR HIGHPOLYMER CO., LTD.**

Quality Products With In-Time Service and Innovation



**TAIWAN INNOVALUE  
WINNER**





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## SWANCOR - Reliable Anti-Corrosion Solution Provider

Established in 1992, SWANCOR has devoted to FRP composite industry as a specialized resin manufacturer and technical consultant. Over the past years, SWANCOR helped customers to produce stronger, tougher, longer-lasting, higher corrosion resistant products. SWANCOR resins have been worldwide recognized for the consistent and premium quality for more than two decades.

Being successfully applied in various fields, SWANCOR resins have been proved of the superior quality and satisfactory services. With thorough understanding of material and FRP composite, unique technology and customized products have been developed. Now, SWANCOR, as an expert in FRP composite field, provides not only the resin itself, but also technical support, which can quickly solve customers' problems. Total solution is what we have offered to the industry.

SWANCOR epoxy vinyl ester resins, while having inherent superior chemical resistance, also combine excellent thermal and mechanical properties of epoxy resins with easier operability. SWANCOR resins with diverse properties are available in order to meet a wide variety of designs, chemical and physical needs. The high strength-weight, toughness and fatigue resistance of resins have made them the best choice for marine, automobile, military, aerospace, sports and anti-corrosion applications.

Typical technical properties, product performances, formulation, and handling of SWANCOR epoxy vinyl ester resins are shown in the following pages. Please refer to Corrosion Resistance Guide for more information about chemical resistance of SWANCOR resins. We encourage our customers to review this catalog carefully before choosing suitable resins for applications. Additional information are available upon request, please contact SWANCOR offices or local agents near you.





## Formulating SWANCOR Resins

### Curing System

One of the most important factors governing the corrosion resistance of composites is the degree of cure of the resins. For general purpose, it is recommended that the laminate reaches a minimum of 90% of the barcol hardness value listed in the datasheets.

Standard catalysts, such as Methyl Ethyl Ketone Peroxide (MEKP) and Benzol Peroxide (BPO), can be used with SWANCOR vinyl ester resins. Cumene Hydroperoxide (CHP) is recommended for resins with high peak exotherm, such as SWANCOR 907 series. MEKP and CHP are commonly used with promoters, typically Cobalt Octoate (CoOct) or Cobalt Naphthenate (CoNap), and accelerators, typically Dimethyl Aniline (DMA). BPO is normally used with DMA together at room temperature.

The optimum usage ratio of MEKP (55% active oxygen content) to CoOct or CoNap (6% cobalt content) ranges from 3/1 to 10/1. The ratio of DMA accelerator to catalysts suggested in the following pages can be adjusted by customers in order to achieve the best performance.

SWANCOR also offers cobalt promotor products-SWANCOR 1305 and SWANCOR 1306 which make it easier for customers to use on site. For detailed application recommendations, please refer to the gel time table for subsequent products.

**CAUTION:** The cobalt promotor should never be mixed directly with a peroxide catalyst (such as MEKP). Mixing cobalt with peroxide catalysts could cause violent reaction, fire or explosion.

For optimum result, the ratio of 98% BPO to 100% DMA should range from 10/1 to 15/1. Ratio out of the recommended range could lead to non-gel, or under-cure. In such case, post-cure would be ineffective.



## Air Inhibition

When processing in an open mold, oxygen in the atmosphere tends to inhibit the complete cure of an exposed FRP surface. If air exposure occurs, the surface may be under-cure, and further results in the reduction of chemical resistance as well as failure of long-term service of FRP vessels and parts.

SWANCOR 1360 is a paraffin wax solution, which can be added to the resin as topcoat layer so that the exposure of air can be prevented.

Note: If the wax is applied, the top layer of the wax should be removed under reconstruction, because the wax layer will reduce the adhesion between the laminates.

## Moisture

It should be aware of that high humidity could considerably slow the curing in Cobalt/MEKP systems. Sealing the vessels right after usage is also required so that moisture can be prohibited from contacting with the resins. Besides, it is important to ensure that no moisture is absorbed by reinforcement and fillers, such as glass fiber mat, surface veils and thixotropic agents, while they are stored.

## Post-cure

The performance of composite product can be enhanced by post-curing the finished parts. Post-curing provides benefits in two ways: complete the curing reaction that maximizes the cross-linking density and eliminates un-reacted functional groups.

To maximize the effectiveness, post-curing should be performed soon after the composite is gelled and the exothermic process is accomplished. Ideally, composite should be post-cured at 80°C for 4 hours. Time for post-cure would be longer if the workpiece becomes thicker.

If the laminate is applied to a substrate which has a different thermal expansion coefficient, cracks and/or peel-off may occur at temperature over 60°C. In such case, primer with high flexibility or post-curing under 60°C for a longer period is suggested. Both will prevent failure of adhesion between laminate and substrate.

## Compliance with US FDA Regulations

Vinyl ester resins, SWANCOR 901 and SWANCOR 907 series comply with the U.S. Food and Drug Administration (FDA) 21 CFR 177.2420 if properly formulated and cured.

The following procedures can help to achieve FDA compliance:

- ◆ Use a formulation that low styrene will be residual. For example, CoOct/MEKP or CoOct/CHP curing systems.
- ◆ Thoroughly clean the intended part to remove any dust or dirt prior to post-cure.
- ◆ Post-cure with dry heat for 2 hours at 90°C or 4 hours at 80°C.
- ◆ Treat the part with steam or immerse the part in hot water for 8-16 hours at 70°C or higher temperature.
- ◆ Wash the part with detergent and rinse it thoroughly before placing in service.

It should be noted that steaming is recommended only after post-cure by dry heat because moisture may result in improper cure and/or discoloration of surface.





## General Purpose - SWANCOR 901 Series

SWANCOR 901 Series are Bisphenol A type vinyl ester resins which provide excellent corrosion resistance to a broad range of organic and inorganic acids, alkalis, oxidizing chemicals and salt solutions etc. It also provides good mechanical strength such as tensile and flexural while incorporated with reinforcement.

### Features

- ◆ Superior toughness.
- ◆ Excellent fatigue resistance.
- ◆ Highest performance-to-cost ratio.
- ◆ Approved by DNV and Lloyd's register for marine.
- ◆ Compliance with US FDA regulation 21 CFR 177.2420.

### Products

|               |  |
|---------------|--|
| SWANCOR 901   | Standard resin, the best choice for most application |
| SWANCOR 901-3 | Premium resin with improved reactivity and purity    |
| SWANCOR 901-V | Lower viscosity for infusion process                 |

\*1 Pre-promoted and pre-thixotroped resins are supplied by request. These resins will have shorter self-life.

**Table 1. Typical Properties of Liquid Resins**

| PROPERTY                                | SWANCOR 901 | SWANCOR 901-3 | SWANCOR 901-V |
|---|-------------|---------------|---------------|
| Solid Content, %                        | 55±1        | 55±1          | --            |
| Viscosity, cps <sup>*2</sup>            | 450±100     | 350±100       | 200±80        |
| Specific Gravity                        | 1.04±0.01   | 1.04±0.01     | 1.04±0.02     |
| Shelf Life, months (25°C) <sup>*3</sup> | 9           | 9             | 6             |

\*2 Brookfield viscometer LVT#3 spindle, 60rpm at 25°C

\*3 Non-promoted and non-thixotroped resin at 25°C



**Table 2. Typical Properties of 3.2mm Clear Casting**

| PROPERTY                                      | SWANCOR 901   | SWANCOR 901-3 | SWANCOR 901-V |
|---|---------------|---------------|---------------|
| Tensile Strength, psi                         | 11,000~13,000 | 11,000~14,000 | 11,000~14,000 |
| Tensile Modulus, 10 <sup>5</sup> psi          | 4.7~5.1       | 4.8~5.2       | 4.8~5.2       |
| Tensile Elongation, %                         | 5.0~6.0       | 5.0~6.0       | 5.0~6.0       |
| Flexural Strength, psi                        | 18,000~22,000 | 19,000~23,000 | 17,000~20,000 |
| Flexural Modulus, 10 <sup>5</sup> psi         | 4.8~5.4       | 4.5~5.2       | 4.5~4.9       |
| Volume Shrinkage, %                           | 7.5~8.0       | 7.5~8.0       | 7.5~8.0       |
| Heat Distortion Temperature, °C <sup>*4</sup> | 108~112       | 100~105       | 102~105       |
| Barcol Hardness                               | 30~38         | 32~38         | 30~38         |

\*4 Cure condition for HDT: 24 hours at room temperature then 2 hours at 105°C

Note:

1. The data listed is intended to be typical properties and is not to be construed as specification.
2. For up-to-date and detail information please refer to individual data sheet.

**Table 3. Gel Time Table of SWANCOR 901 Using MEKP**

| Gel Time<br>Temperature               | Materials | 10~20 min | 20~40 min | 40~60 min |
|---------------------------------------|-----------|-----------|-----------|-----------|
| Cured by MEKP/CoOct/DMA <sup>*5</sup> |           |           |           |           |
| 20°C/68°F                             | MEKP      | 1.80%     | 1.50%     | 1.20%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.40%     |
|                                       | DMA       | 0.10%     | 0.05%     | 0.05%     |
| 25°C/77°F                             | MEKP      | 1.50%     | 1.20%     | 1.20%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.30%     |
|                                       | DMA       | 0.08%     | 0.03%     | 0.02%     |
| 30°C/86°F                             | MEKP      | 1.20%     | 1.00%     | 1.00%     |
|                                       | CoOct     | 0.40%     | 0.30%     | 0.30%     |
|                                       | DMA       | 0.05%     | 0.03%     | 0.00%     |
| Cured by BPO/DMA <sup>*6</sup>        |           |           |           |           |
| 20°C/68°F                             | BPO       | 1.50%     | 1.50%     | 1.20%     |
|                                       | DMA       | 0.20%     | 0.10%     | 0.06%     |
| 25°C/77°F                             | BPO       | 1.50%     | 1.25%     | 1.00%     |
|                                       | DMA       | 0.15%     | 0.10%     | 0.06%     |
| 30°C/86°F                             | BPO       | 1.50%     | 1.05%     | 1.00%     |
|                                       | DMA       | 0.12%     | 0.06%     | 0.04%     |

\*5 Concentration: CoOct: 6%, DMA: 100%

\*6 Concentration: BPO: 98%, DMA: 100%

**Table 4. Gel Time Table of SWANCOR 901-3 Using MEKP**

| Gel Time<br>Temperature             | Materials | 10~20 min | 20~40 min | 45~75 min |
|-------------------------------------|-----------|-----------|-----------|-----------|
| MEKP/CoOct/DMA or TBC <sup>*7</sup> |           |           |           |           |
| 15°C/59°F                           | MEKP      | 1.60%     | 1.50%     | 1.20%     |
|                                     | CoOct     | 0.80%     | 0.60%     | 0.40%     |
|                                     | DMA       | 0.05%     | --        | --        |
| 20°C/68°F                           | MEKP      | 1.30%     | 1.00%     | 0.80%     |
|                                     | CoOct     | 0.60%     | 0.40%     | 0.20%     |
|                                     | DMA       | 0.04%     | --        | 0.02%     |
| 25°C/77°F                           | MEKP      | 0.80%     | 0.80%     | 0.80%     |
|                                     | CoOct     | 0.50%     | 0.40%     | 0.20%     |
|                                     | DMA       | --        | --        | --        |
| 30°C/86°F                           | MEKP      | 0.80%     | 0.80%     | 0.80%     |
|                                     | CoOct     | 0.40%     | 0.20%     | 0.20%     |
|                                     | DMA       | --        | 0.01%     | --        |
| 35°C/95°F                           | MEKP      | 0.80%     | 0.80%     | 0.80%     |
|                                     | CoOct     | 0.30%     | 0.20%     | 0.20%     |
|                                     | TBC       | --        | --        | 0.01%     |

\*7 Concentration: CoOct: 6%, DMA: 100%, TBC: 100%

Note:

1. The data listed is intended to be typical properties and is not to be construed as specification.
2. For up-to-date and detail information please refer to individual data sheet.

### Table 5. Gel Time Table of SWANCOR 901-3 Using CHP

| Gel Time Temperature                 | Materials | 10~20 min | 20~40 min | 45~75 min |
|--------------------------------------|-----------|-----------|-----------|-----------|
| Cured by CHP/CoOct/DMA <sup>*8</sup> |           |           |           |           |
| 15°C/59°F                            | CHP       | –         | –         | 2.00%     |
|                                      | CoOct     | –         | –         | 1.20%     |
|                                      | DMA       | –         | –         | 0.12%     |
| 20°C/68°F                            | CHP       | –         | 1.50%     | 1.20%     |
|                                      | CoOct     | –         | 0.80%     | 0.10%     |
|                                      | DMA       | –         | 0.08%     | 0.01%     |
| 25°C/77°F                            | CHP       | 0.80%     | 0.80%     | 0.80%     |
|                                      | CoOct     | 0.20%     | 0.10%     | 0.05%     |
|                                      | DMA       | 0.20%     | 0.10%     | 0.05%     |
| 30°C/86°F                            | CHP       | 1.00%     | 0.80%     | 0.80%     |
|                                      | CoOct     | 0.40%     | 0.10%     | 0.04%     |
|                                      | DMA       | 0.04%     | 0.10%     | 0.04%     |
| 35°C/95°F                            | CHP       | 0.80%     | 0.80%     | 0.80%     |
|                                      | CoOct     | 0.30%     | 0.05%     | 0.02%     |
|                                      | DMA       | 0.03%     | 0.05%     | 0.02%     |

\*8 Concentration: CoOct: 6%, DMA: 100%

### Table 6. Gel Time Table of SWANCOR 901-3 Using BPO

| Gel Time Temperature           | Materials | 10~20 min | 20~40 min | 45~75 min |
|--------------------------------|-----------|-----------|-----------|-----------|
| Cured by BPO/DMA <sup>*9</sup> |           |           |           |           |
| 20°C/68°F                      | BPO       | 1.40%     | 1.40%     | 1.40%     |
|                                | DMA       | 0.15%     | 0.10%     | 0.06%     |
| 25°C/77°F                      | BPO       | 1.00%     | 1.00%     | 1.00%     |
|                                | DMA       | 0.10%     | 0.08%     | 0.04%     |
| 30°C/86°F                      | BPO       | 0.80%     | 0.80%     | 0.80%     |
|                                | DMA       | 0.13%     | 0.08%     | 0.05%     |
| 35°C/95°F                      | BPO       | 0.70%     | 0.70%     | 0.70%     |
|                                | DMA       | 0.10%     | 0.06%     | 0.04%     |

\*9 Concentration: BPO: 98%, DMA: 100%

Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

**Table 7. Gel Time Table of SWANCOR 901-3 Using MEKP and 1305**

| Gel Time<br>Temperature    | Materials | 10~20 min | 20~30 min | 30~40 min | 40~60 min |
|----------------------------|-----------|-----------|-----------|-----------|-----------|
| Cured by MEKP/SWANCOR 1305 |           |           |           |           |           |
| 15°C/59°F                  | 1305      | 3%        | 2.5%      | 2.1%      | 2%        |
|                            | MEKP      | 2%        | 2%        | 2%        | 2%        |
| 20°C/68°F                  | 1305      | 2%        | 1%        | 0.9%      | 0.6%      |
|                            | MEKP      | 1.5%      | 1.5%      | 1.5%      | 1.5%      |
| 25°C/77°F                  | 1305      | 1.2%      | 0.8%      | 0.6%      | 0.5%      |
|                            | MEKP      | 1.2%      | 1.2%      | 1.2%      | 1.2%      |
| 30°C/86°F                  | 1305      | 1.2%      | 0.8%      | 0.5%      | 0.4%      |
|                            | MEKP      | 1.2%      | 1.2%      | 1.2%      | 1.2%      |
| 35°C/95°F                  | 1305      | 0.6%      | 0.2%      | 0.5%      | 0.4%      |
|                            | MEKP      | 1.2%      | 1.2%      | 0.8%      | 0.8%      |

**Table 8. Gel Time Table of SWANCOR 901-V Using MEKP**

| Gel Time<br>Temperature                | Materials | 10~20 min | 20~40 min | 40~60 min |
|--|-----------|-----------|-----------|-----------|
| Cured by MEKP/CoOct/DMA* <sup>10</sup> |           |           |           |           |
| 18°C/64°F                              | MEKP      | 1.80%     | 1.50%     | 1.20%     |
|  | CoOct     | 0.40%     | 0.40%     | 0.40%     |
|  | DMA       | 0.10%     | 0.05%     | 0.03%     |
| 25°C/77°F                              | MEKP      | 1.50%     | 1.20%     | 1.20%     |
|  | CoOct     | 0.40%     | 0.40%     | 0.30%     |
|  | DMA       | 0.06%     | 0.03%     | 0.02%     |
| 30°C/86°F                              | MEKP      | 1.20%     | 1.20%     | 1.00%     |
|  | CoOct     | 0.40%     | 0.30%     | 0.30%     |
|  | DMA       | 0.05%     | 0.03%     | 0.02%     |

\*10 Concentration: CoOct: 6%, DMA: 100%

**Table 9. Gel Time Table of SWANCOR 901-V Using CHP**

| Gel Time<br>Temperature               | Materials | 20~40 min | 40~60 min |
|---------------------------------------|-----------|-----------|-----------|
| Cured by CHP/CoOct/DMA* <sup>11</sup> |           |           |           |
| 25°C/77°F                             | CHP       | 1.60%     | 1.50%     |
|                                       | CoOct     | 0.60%     | 0.70%     |
|                                       | DMA       | 0.06%     | 0.07%     |
| 30°C/86°F                             | CHP       | 1.50%     | 1.40%     |
|                                       | CoOct     | 0.60%     | 0.50%     |
|                                       | DMA       | 0.06%     | 0.05%     |

\*11 Concentration: CoOct: 6%, DMA: 100%

Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

## Fire Retardant Type - SWANCOR 905 Series

SWANCOR 905 Series provides excellent corrosion resistance to a broad range of organic and inorganic acids, alkalis, oxidizing chemicals and salt solutions etc as good as Bisphenol A type resins. It also provides very good mechanical strength while incorporated with reinforcement. SWANCOR 905 Series offers excellent flame retardant for FRP applications. ASTM E84 Class 1 Flame Spread Index (FSI) can be achieved while incorporated with antimony trioxide or antimony pentoxide.

### Features

- ◆ Superior toughness.
- ◆ Exceptional flame retardant.
- ◆ Excellent fatigue resistance.

### Products

|               |   |
|---------------|---|
| SWANCOR 905-2 | ASTM E84 Class 1 flame spread index while incorporated with antimony trioxide.  |
| SWANCOR 905C  | ASTM E84 Class 1 flame spread index while incorporated with antimony pentoxide. |
| SWANCOR 905-N | Combination of excellent flame retardant and heat resistant.                    |

**Table 10. Typical Properties of Liquid Resins**

| PROPERTY                                | SWANCOR 905-2 | SWANCOR 905C | SWANCOR 905-N |
|---|---------------|--------------|---------------|
| Solid Content, %                        | 58±1.5        | 65±1.5       | 60.5±1.5      |
| Viscosity, cps <sup>*1</sup>            | 380±100       | 350±100      | 350±100       |
| Specific Gravity                        | 1.15±0.02     | 1.15±0.02    | 1.15±0.01     |
| Shelf Life, months (25°C) <sup>*2</sup> | 6             | 6            | 3             |

\*1 Brookfield viscometer LVT#3 spindle, 60rpm at 25°C

\*2 Non-promoted and non-thixotroped resin at 25°C

**Table 11. Typical Properties of 3.2mm Clear Casting**

| PROPERTY                                      | SWANCOR 905-2 | SWANCOR 905C  | SWANCOR 905-N |
|---|---------------|---------------|---------------|
| Tensile Strength, psi                         | 11,000~13,000 | 11,000~13,000 | 9,800~13,000  |
| Tensile Modulus, 10 <sup>5</sup> psi          | 5.0~5.4       | 4.0~5.0       | 4.6~5.5       |
| Tensile Elongation, %                         | 4.5~5.5       | 5.0~6.0       | 3.2~5.8       |
| Flexural Strength, psi                        | 16,000~19,000 | 17,000~22,000 | 19,000~22,000 |
| Flexural Modulus, 10 <sup>5</sup> psi         | 5.0~5.4       | 4.5~5.4       | 4.6~5.5       |
| Volume Shrinkage, %                           | 7.5~8.0       | 7.0~8.0       | 8.0~9.0       |
| Heat Distortion Temperature, °C <sup>*3</sup> | 106~110       | 106~116       | 127~136       |
| Barcol Hardness                               | 40±3          | 35±3          | 42±3          |

\*3 Cure condition for HDT: 24 hours at room temperature then 2 hours at 105°C

Note:

1.The data listed is intended to be typical properties and is not to be construed as specification.

2.For up-to-date and detail information please refer to individual data sheet.



**Table 12. Gel Time Table of SWANCOR 905-2 Using MEKP**

| Gel Time Temperature                  | Materials | 10~20 min | 20~40 min | 40~60 min |
|---------------------------------------|-----------|-----------|-----------|-----------|
| Cured by MEKP/CoOct/DMA* <sup>5</sup> |           |           |           |           |
| 20°C/68°F                             | MEKP      | 1.20%     | 1.20%     | 1.20%     |
|                                       | CoOct     | 0.60%     | 0.40%     | 0.40%     |
|                                       | DMA       | 0.07%     | 0.05%     | 0.03%     |
| 25°C/77°F                             | MEKP      | 1.20%     | 1.20%     | 1.20%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.40%     |
|                                       | DMA       | 0.07%     | 0.04%     | 0.02%     |
| 30°C/86°F                             | MEKP      | 1.00%     | 1.00%     | 1.00%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.40%     |
|                                       | DMA       | 0.06%     | 0.04%     | 0.01%     |
| 35°C/95°F                             | MEKP      | 1.00%     | 1.00%     | 0.80%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.40%     |
|                                       | DMA       | 0.04%     | 0.02%     | 0.02%     |
| 40°C/104°F                            | MEKP      | 1.00%     | 1.00%     | 0.80%     |
|                                       | CoOct     | 0.30%     | 0.30%     | 0.30%     |
|                                       | DMA       | 0.04%     | 0.03%     | 0.01%     |

\*5 Concentration: CoOct: 6%, DMA: 100%

**Table 13. Gel Time Table of SWANCOR 905C Using MEKP**

| Gel Time Temperature                  | Materials | 10~20 min | 20~40 min | 40~60 min |
|---------------------------------------|-----------|-----------|-----------|-----------|
| Cured by MEKP/CoOct/DMA* <sup>4</sup> |           |           |           |           |
| 20°C/68°F                             | MEKP      | 1.00%     | 1.00%     | 0.80%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.40%     |
|                                       | DMA       | 0.20%     | 0.10%     | 0.05%     |
| 25°C/77°F                             | MEKP      | 1.20%     | 1.00%     | 0.90%     |
|                                       | CoOct     | 0.40%     | 0.30%     | 0.30%     |
|                                       | DMA       | 0.08%     | 0.02%     | 0.02%     |
| 30°C/86°F                             | MEKP      | 1.20%     | 1.00%     | 0.90%     |
|                                       | CoOct     | 0.40%     | 0.30%     | 0.30%     |
|                                       | DMA       | 0.05%     | 0.02%     | 0.01%     |

\*4 Concentration: CoOct: 6%, DMA: 100%



Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

## High Temperature Resistant Type - SWANCOR 907 Series

SWANCOR 907 Series combines superior retention of mechanical properties at high temperature, such as tensile and flexural strength, and superior corrosion to chemical mixture, oxidizing chemicals and solvents etc.

### Features

- ◆ Superior toughness.
- ◆ Excellent fatigue resistance.
- ◆ Premium performance at elevated temperature.
- ◆ Compliance with US FDA regulation 21 CFR 177.2420.

### Products

|               |   |
|---------------|---|
| SWANCOR 907-1 | Temperature resistance up to 150°C                      |
| SWANCOR 900   | Temperature resistance up to 165°C                      |
| SWANCOR 977-S | Superior performance at extreme temperature up to 210°C |

**Table 14. Typical Properties of Liquid Resins**

| PROPERTY                                | SWANCOR 907-1 | SWANCOR 900 | SWANCOR 977-S |
|---|---------------|-------------|---------------|
| Solid Content, %                        | 67±1          | 64.5±1      | 71.5±2.0      |
| Viscosity, cps <sup>*1</sup>            | 335±65        | 350±100     | 750±150       |
| Specific Gravity                        | 1.06±0.02     | 1.07±0.01   | 1.08±0.02     |
| Shelf Life, months (25°C) <sup>*2</sup> | 6             | 6           | 6             |

\*1 Brookfield viscometer LVT#3 spindle, 60rpm at 25°C

\*2 Non-promoted and non-thixotroped resin at 25°C



**Table 15. Typical Properties of 3.2mm Clear Casting**

| PROPERTY                              | SWANCOR 907-1            | SWANCOR 900              | SWANCOR 977-S            |
|---------------------------------------|--------------------------|--------------------------|--------------------------|
| Tensile Strength, psi                 | 11,000~13,000            | 11,000~13,000            | 9,000~11,000             |
| Tensile Modulus, 10 <sup>5</sup> psi  | 5.0~5.3 X10 <sup>5</sup> | 5.0~5.3 X10 <sup>5</sup> | 5.2~5.6 X10              |
| Tensile Elongation, %                 | 2.0~4.0                  | 2.2~2.8                  | 1.5~2.5                  |
| Flexural Strength, psi                | 18,000~21,000            | 17,000~20,000            | 13,000~18,000            |
| Flexural Modulus, 10 <sup>5</sup> psi | 5.2~5.9 X10 <sup>5</sup> | 5.4~5.9 X10 <sup>5</sup> | 5.6~6.2 X10 <sup>5</sup> |
| Volume Shrinkage, %                   | 8.5~9.5                  | 9.0~9.5                  | 9.0~10.0                 |
| Heat Distortion Temperature, °C       | 144~150 <sup>*3</sup>    | 155~165 <sup>*4</sup>    | 205~210 <sup>*4</sup>    |
| Barcol Hardness                       | 40~46                    | 40~46                    | 45~55                    |

\*3 Post condition: 24 hours at room temperature then 24 hours at 150°C

\*4 Post condition: 24 hours at room temperature then 24 hours at 200°C

Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

**Table 16. Gel Time Table of SWANCOR 907-1 Using MEKP**

| Gel Time Temperature                  | Materials | 10~20 min | 20~40 min | 40~60 min |
|---------------------------------------|-----------|-----------|-----------|-----------|
| Cured by MEKP/CoOct/DMA <sup>*5</sup> |           |           |           |           |
| 20°C/64°F                             | CoOct     | 0.40%     | 0.40%     | 0.30%     |
|                                       | DMA       | 0.08%     | 0.08%     | 0.06%     |
|                                       | MEKP      | 1.50%     | 1.00%     | 1.00%     |
| 25°C/77°F                             | CoOct     | 0.30%     | 0.40%     | 0.20%     |
|                                       | DMA       | 0.06%     | 0.08%     | 0.03%     |
|                                       | MEKP      | 1.00%     | 1.00%     | 1.00%     |
| 30°C/86°F                             | CoOct     | 0.30%     | 0.25%     | 0.20%     |
|                                       | DMA       | 0.06%     | 0.04%     | 0.03%     |
|                                       | MEKP      | 1.00%     | 1.00%     | 0.90%     |

\*5 Concentration: CoOct: 6%, DMA: 100%

**Table 17. Gel Time Table of SWANCOR 907-1 Using CHP**

| Gel Time Temperature                 | Materials | 10~20 min | 20~40 min | 40~60 min |
|--------------------------------------|-----------|-----------|-----------|-----------|
| Cured by CHP/CoOct/DMA <sup>*6</sup> |           |           |           |           |
| 20°C/64°F                            | CoOct     | 0.50%     | 0.40%     | 0.20%     |
|                                      | DMA       | 0.08%     | 0.06%     | 0.04%     |
|                                      | CHP       | 1.20%     | 1.00%     | 1.00%     |
| 25°C/77°F                            | CoOct     | 0.40%     | 0.20%     | 0.20%     |
|                                      | DMA       | 0.06%     | 0.04%     | 0.02%     |
|                                      | CHP       | 1.00%     | 1.00%     | 0.80%     |
| 30°C/86°F                            | CoOct     | 0.20%     | 0.20%     | 0.20%     |
|                                      | DMA       | 0.04%     | --        | --        |
|                                      | CHP       | 1.00%     | 0.60%     | 0.50%     |

\*6 Concentration: CoOct: 6%, DMA: 100%

**Table 18. Gel Time Table of SWANCOR 907-1 Using M-50**

| Gel Time Temperature                  | Materials | 10~20 min | 20~40 min | 40~60 min |
|---------------------------------------|-----------|-----------|-----------|-----------|
| Cured by M-50/CoOct/DMA <sup>*7</sup> |           |           |           |           |
| 20°C/64°F                             | CoOct     | 0.40%     | 0.30%     | 0.20%     |
|                                       | DMA       | 0.06%     | 0.06%     | 0.05%     |
|                                       | M-50      | 1.00%     | 1.00%     | 1.00%     |
| 25°C/77°F                             | CoOct     | 0.30%     | 0.25%     | 0.20%     |
|                                       | DMA       | 0.06%     | 0.05%     | 0.05%     |
|                                       | M-50      | 1.00%     | 1.00%     | 1.00%     |
| 30°C/86°F                             | CoOct     | 0.30%     | 0.30%     | 0.20%     |
|                                       | DMA       | 0.06%     | 0.05%     | 0.02%     |
|                                       | M-50      | 1.00%     | 1.00%     | 0.80%     |

\*7 Concentration: CoOct: 6%, DMA: 100%

Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

**Table 19. Gel Time Table of SWANCOR 900 Using CHP**

| Gel Time<br>Temperature              | Materials | 10~20 min | 20~40 min | 40~60 min |
|--------------------------------------|-----------|-----------|-----------|-----------|
| Cured by CHP/CoOct/DMA <sup>*8</sup> |           |           |           |           |
| 20°C/64°F                            | CHP       | –         | 3.00%     | 1.50%     |
|                                      | CoOct     | –         | 0.60%     | 0.20%     |
|                                      | DMA       | –         | 0.10%     | –         |
| 25°C/77°F                            | CHP       | 1.50%     | 1.50%     | 1.50%     |
|                                      | CoOct     | 0.40%     | 0.20%     | 0.15%     |
|                                      | DMA       | 0.05%     | –         | –         |
| 30°C/86°F                            | CHP       | 1.50%     | 0.80%     | 0.80%     |
|                                      | CoOct     | 0.20%     | 0.15%     | 0.10%     |
|                                      | DMA       | 0.02%     | –         | –         |

\*8 Concentration: CoOct: 6%, DMA: 100%

**Table 20. Gel Time Table of SWANCOR 977-S Using CHP**

| Gel Time<br>Temperature              | Materials | 10~20 min | 20~40 min | 40~60 min |
|--------------------------------------|-----------|-----------|-----------|-----------|
| Cured by CHP/CoOct/DMA <sup>*9</sup> |           |           |           |           |
| 20°C/64°F                            | CHP       | –         | 2.00%     | 1.50%     |
|                                      | CoOct     | –         | 0.40%     | 0.20%     |
|                                      | DMA       | –         | –         | –         |
| 25°C/77°F                            | CHP       | 2.00%     | 1.50%     | 1.50%     |
|                                      | CoOct     | 0.40%     | 0.20%     | 0.10%     |
|                                      | DMA       | 0.05%     | –         | –         |
| 30°C/86°F                            | CHP       | 2.00%     | 1.00%     | 1.00%     |
|                                      | CoOct     | 0.20%     | 0.15%     | 0.10%     |
|                                      | DMA       | –         | –         | –         |

\*9 Concentration: CHP:80%, CoOct: 6%, DMA: 100%

Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

## High Elongation Type - SWANCOR 980

SWANCOR 980 is elastomer modified epoxy vinyl ester resin which provides excellent elongation (i.e.superior toughness) of FRP laminates. The advantages of SWANCOR 980 including increased adhesion strength to substrate, superior impact strength, premium abrasion and stress resistance. It also has good corrosion resistance to a broad range of organic and inorganic acid, alkalis, oxidizing chemicals and salt solutions etc.

### Features

- ◆ Excellent fatigue resistance.
- ◆ Superior toughness and impact strength.

**Table 21. Typical Properties of Liquid Resins**

| PROPERTY                                | SWANCOR 980 |
|---|-------------|
| Solid Content, %                        | 55±1        |
| Viscosity, cps <sup>*1</sup>            | 375±75      |
| Specific Gravity                        | 1.02±0.01   |
| Shelf Life, months (25°C) <sup>*2</sup> | 6           |

\*1 Brookfield viscometer LVT#3 spindle, 60rpm at 25°C

\*2 Non-promoted and non-thixotroped resin at 25°C

**Table 22. Typical Properties of 3.2mm Clear Casting**

| PROPERTY                                      | SWANCOR 980   |
|---|---------------|
| Tensile Strength, psi                         | 9,000~10,000  |
| Tensile Modulus, 10 <sup>5</sup> psi          | 4.5~4.8       |
| Tensile Elongation, %                         | 6.0~9.0       |
| Flexural Strength, psi                        | 15,000~17,000 |
| Flexural Modulus, 10 <sup>5</sup> psi         | 4.3~4.8       |
| Volume Shrinkage, %                           | 7.5~8.5       |
| Heat Distortion Temperature, °C <sup>*3</sup> | 76~82         |
| Barcol Hardness                               | 28~34         |

\*3 Cure condition for HDT: 24 hours at room temperature then 2 hours at 105°C



### Table 23. Gel Time Table of SWANCOR 980 Using MEKP

| Gel Time<br>Temperature               | Materials | 10~20 min | 20~40 min | 40~60 min |
|---------------------------------------|-----------|-----------|-----------|-----------|
| Cured by MEKP/CoOct/DMA <sup>*4</sup> |           |           |           |           |
| 18°C/64°F                             | MEKP      | 1.50%     | 1.20%     | 1.20%     |
|                                       | CoOct     | 0.40%     | 0.30%     | 0.25%     |
|                                       | DMA       | 0.05%     | 0.05%     | 0.05%     |
| 20°C/68°F                             | MEKP      | 1.20%     | 1.20%     | 1.00%     |
|                                       | CoOct     | 0.40%     | 0.20%     | 0.20%     |
|                                       | DMA       | 0.03%     | 0.03%     | 0.03%     |
| 30°C/86°F                             | MEKP      | 1.20%     | 1.00%     | 1.00%     |
|                                       | CoOct     | 0.40%     | 0.30%     | 0.20%     |
|                                       | DMA       | 0.03%     | 0.01%     | 0.01%     |

\*4 Concentration: CoOct: 6%, DMA: 100%

### Table 24. Gel Time Table of SWANCOR 980 Using BPO

| Gel Time<br>Temperature        | Materials | 10~20 min | 20~40 min | 40~60 min |
|--------------------------------|-----------|-----------|-----------|-----------|
| Cured by BPO/DMA <sup>*5</sup> |           |           |           |           |
| 18°C/64°F                      | BPO       | 1.20%     | 1.00%     | 1.00%     |
|                                | DMA       | 0.06%     | 0.08%     | 0.04%     |
| 25°C/77°F                      | BPO       | 1.00%     | 1.00%     | 1.00%     |
|                                | DMA       | 0.06%     | 0.05%     | 0.03%     |
| 30°C/86°F                      | BPO       | 1.00%     | 0.80%     | 0.60%     |
|                                | DMA       | 0.04%     | 0.03%     | 0.03%     |

\*5 Concentration: BPO: 98%, DMA: 100%

Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

## Low Styrene Emission Type - SWANCOR 901-LSE

SWANCOR 901-LSE is a bisphenol-A vinyl ester resin with maximum of 35% styrene by weight, providing lower VOC emission with up to 50% reduction compared to non-LSE product. It exhibits excellent physical properties in boat and pool manufacturing industries. SWANCOR 901-LSE is especially adapted to meet the requirements of spray-up and hand-lay-up applications.

### Features

- ◆ Superior toughness.
- ◆ Low styrene content.

**Table 25. Typical Properties of Liquid Resins**

| PROPERTY                     | SWANCOR 901-LSE |
|------------------------------|-----------------|
| Solid Content, %             | 66±1            |
| Viscosity, cps <sup>*1</sup> | 350±100         |
| Shelf Life, months (25°C)    | 6               |

\*1 LVT #3-60rpm, at 25°C

**Table 26. Typical Properties of 3.2mm Clear Casting**

| PROPERTY                                      | SWANCOR 901-LSE |
|---|-----------------|
| Tensile Strength, psi                         | 12,000~14,000   |
| Tensile Modulus, 10 <sup>5</sup> psi          | 5.0~5.4         |
| Tensile Elongation, %                         | 3.0~5.0         |
| Flexural Strength, psi                        | 20,000~24,000   |
| Flexural Modulus, 10 <sup>5</sup> psi         | 5.2~5.9         |
| Heat Distortion Temperature, °C <sup>*2</sup> | 114~124         |

\*2 Cure condition for HDT: 24 hours at room temperature then 2 hours at 105°C

**Table 27. Gel Time Table of SWANCOR 901-LSE Using MEKP**

| Gel Time<br>Temperature               | Materials | 10~20 min | 20~40 min | 40~60 min |
|---------------------------------------|-----------|-----------|-----------|-----------|
| Cured by MEKP/CoOct/DMA <sup>*4</sup> |           |           |           |           |
| 15°C/59°F                             | MEKP      | 1.80%     | 1.20%     | 1.20%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.40%     |
|                                       | DMA       | 0.12%     | 0.08%     | 0.04%     |
| 20°C/68°F                             | MEKP      | 1.50%     | 1.00%     | 1.00%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.40%     |
|                                       | DMA       | 0.10%     | 0.06%     | 0.03%     |
| 25°C/77°F                             | MEKP      | 1.20%     | 1.00%     | 1.00%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.30%     |
|                                       | DMA       | 0.08%     | 0.04%     | 0.02%     |
| 30°C/86°F                             | MEKP      | 1.00%     | 1.00%     | 0.80%     |
|                                       | CoOct     | 0.40%     | 0.40%     | 0.30%     |
|                                       | DMA       | 0.06%     | 0.03%     | 0.02%     |

\*4 Concentration: CoOct: 6%, DMA: 100%

**Table 28. Gel Time Table of SWANCOR 901-LSE Using BPO**

| Gel Time<br>Temperature        | Materials | 10~20 min | 20~40 min | 40~60 min |
|--------------------------------|-----------|-----------|-----------|-----------|
| Cured by BPO/DMA <sup>*5</sup> |           |           |           |           |
| 15°C/59°F                      | BPO       | 1.70%     | 1.50%     | 1.20%     |
|                                | DMA       | 0.25%     | 0.20%     | 0.15%     |
| 20°C/68°F                      | BPO       | 1.50%     | 1.50%     | 1.20%     |
|                                | DMA       | 0.20%     | 0.15%     | 0.10%     |
| 25°C/77°F                      | BPO       | 1.20%     | 1.20%     | 1.20%     |
|                                | DMA       | 0.20%     | 0.15%     | 0.09%     |
| 30°C/86°F                      | BPO       | 1.20%     | 1.20%     | 1.20%     |
|                                | DMA       | 0.15%     | 0.10%     | 0.08%     |

\*5 Concentration: BPO: 98%, DMA: 100%

Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

# Vinyl Ester Flake Resin

SWANCOR flake resin combines the superior chemical resistance of vinyl ester resin with simplicity of trowel and hand lay-up applied film coating.

## Features

- ◆ Superior toughness.
- ◆ Excellent corrosion resistance.
- ◆ Provide strong adhesion to substrate.
- ◆ Resist to most of acid, alkali and salt solution.
- ◆ With very low permeability to moisture and water.
- ◆ Cure at room temperature, and shorten the working time.
- ◆ Offer excellent mechanical properties, good weather resistance and excellent heat-resistance.

## Products

|                 |  |
|-----------------|--|
| SWANCOR 901-FLS | General purpose flake resin for spray-up.            |
| SWANCOR 901-FLT | General purpose flake resin for trowel.              |
| SWANCOR 907-FLS | High temperature resistant flake resin for spray-up. |
| SWANCOR 907-FLT | High temperature resistant flake resin for trowel.   |

**Table 29. Typical Properties of Liquid Resins**

| PROPERTY                               | SWANCOR 901-FLS     | SWANCOR 901-FLT     | SWANCOR 907-FLS     | SWANCOR 907-FLT     |
|--|---------------------|---------------------|---------------------|---------------------|
| Viscosity, cps <sup>*1</sup>           | 2,250±750           | —                   | 2,250±750           | —                   |
| Color <sup>*2</sup>                    | off-white           | off-white           | off-white           | off-white           |
| Gel Time, mins                         | 50±10 <sup>*3</sup> | 50±10 <sup>*3</sup> | 50±10 <sup>*3</sup> | 50±10 <sup>*3</sup> |
| Density, kg/l                          | 1.3                 | 1.3                 | —                   | 1.5                 |
| Shelf Life, month (25°C) <sup>*3</sup> | 3                   | 3                   | 2                   | 2                   |

\*1 LVT #4-60 rpm@25°C

\*2 Other colors on special order.

\*3 MEKP 1phr, 6%CoOct 0.1 phr@ 25°C

**Table 30. Typical Properties of Cured Flake Resin**

| PROPERTY                                       | SWANCOR 901-FLS       | SWANCOR 901-FLT       | SWANCOR 907-FLS       | SWANCOR 907-FLT       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| Permeability to Molsture, g/hr.cm <sup>2</sup> | <4.5x10 <sup>-6</sup> | <3.5x10 <sup>-6</sup> | <1.7x10 <sup>-6</sup> | <3.5x10 <sup>-6</sup> |
| Tensile Strength, psi                          | 6,000                 | 3,600                 | 5,000                 | 3,600                 |
| Flexural Strength, psi                         | 9,000                 | 9,400                 | 9,000                 | 8,700                 |
| Compressive Strength, psi                      | 9,100                 | 13,000                | 17,000                | 13,000                |
| Heat Distortion Temperature, °C                | 108~112               | 120                   | 146                   | 160                   |
| Adhesion to Iron, kg/cm <sup>2</sup>           | 150 <sup>*4</sup>     | 130 <sup>*4</sup>     | 130 <sup>*5</sup>     | 130 <sup>*5</sup>     |
| Abraslon, mg <sup>*6</sup>                     | <120                  | <110                  | <145                  | <110                  |

\*4 With SWANCOR 984M primer.

\*5 With SWANCOR 917 primer.

\*6 Load:1000g, 1000 cycles.



Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.

## Vinyl Ester Primer Resin

SWANCOR 984 is an elastomer-modified vinyl ester resin, which is designed for use as primer for lining iron substrate. The inherent resilient properties provide increased flexibility, excellent adhesion and severe mechanical stress. It offers combination of adhesion, flexibility, chemical resistance and abrasion resistance. Meanwhile with thixotropic property, it has ease of handling and fabrication advantages.

SWANCOR CP99 is a primer for lining concrete, which provides strong adhesion to concrete with excellent chemical resistance and good inter laminar adhesion to laminating polyester or vinyl ester resins.

SWANCOR 917 is a vinyl ester based primer for lining on concrete, iron and FRP. It offers excellent bonding between polyester or vinyl ester laminates and substrates. It is designed for use as primer for high temperature environment to maintain good adhesion.

### Features

- ◆ Provide strong adhesion to substrate.
- ◆ Cure at room temperature, and short working time.
- ◆ Offer excellent mechanical properties.

### Products

|              |   |
|--------------|---|
| SWANCOR 984  | Primer for lining iron substrate.       |
| SWANCOR CP99 | Primer for lining concrete.             |
| SWANCOR 917  | Primer for high temperature resistance. |

**Table 31 Typical Properties of Liquid Resins**

| PROPERTY                      | SWANCOR 984   | SWANCOR CP99     | SWANCOR 917            |
|-------------------------------|---------------|------------------|------------------------|
| Appearance                    | Opaque liquid | Amber liquid     | Clear yellowish liquid |
| Solid Content (%)             | 55±1          | --               | --                     |
| Viscosity, cps <sup>*1</sup>  | 400±100       | 200±100          | 375±75                 |
| Gel Time (min) <sup>*2</sup>  | 20±5          | 25±10            | 20±5                   |
| Shelf Life (months/25°C)      | 4             | 6                | 4                      |
| Adhesion, kgf/cm <sup>2</sup> | 150 (to iron) | 79 (to concrete) | 130 (to iron)          |

\*1 LVT-#3-60rpm , 25°C.

\*2 6% Cobalt: 0.4phr, 100%DMA: 0.05phr, 55%MEKP: 1.2phr., 25°C.

Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.



## Resin Storage and Safety Precautions

### Resin Storage

The resins contain certain amount of styrene monomer. Due to volatility of styrene, resins are highly suggested to be stored as below:

- ◆ Keep the resins away from ignition sources, e.g. flames, fire and sparks.
- ◆ Smoking is prohibited in the storage area.
- ◆ Do not store in area exposed to sunlight.
- ◆ Store separately from oxidizing materials, peroxides and metal salts.
- ◆ Keep container tightly closed in case of moisture contamination.
- ◆ To ensure maximum stability and optimum properties, resins should be stored in closed container at temperature below 25°C (77°F).
- ◆ Copper and alloy containing copper should never be resin containers.

### Safety Precautions

It is suggested that operators should read the safety information carefully and thoroughly before handling. Product data sheet and MSDS (Material Safety Data Sheet) are available upon request. For more safety information, please contact Swancor offices or authorized agents in your area.



Note:

- 1.The data listed is intended to be typical properties and is not to be construed as specification.
- 2.For up-to-date and detail information please refer to individual data sheet.









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