Ethylene Copolymer Water Based Emulsion

SUMIKAFLEX®

SUMIELITE®
<table>
<thead>
<tr>
<th>Composition</th>
<th>Grade</th>
<th>Properties of emulsion</th>
<th>Properties of film</th>
<th>Features</th>
<th>Main application</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVA</td>
<td>S-201HQ</td>
<td>55 ~ 77</td>
<td>2500 ~ 5500</td>
<td>3 ~ 6</td>
<td>PVA / Nonionic</td>
<td>0.6</td>
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<tr>
<td></td>
<td>S-460HQ</td>
<td>59</td>
<td>1600 ~ 3500</td>
<td>4 ~ 6</td>
<td>PVA</td>
<td>0.7</td>
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<tr>
<td></td>
<td>S-478HQ</td>
<td>56</td>
<td>2000 ~ 4000</td>
<td>4 ~ 7</td>
<td>PVA / Nonionic</td>
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<td></td>
<td>S-483HQ</td>
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<td>2000 ~ 6000</td>
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<td>PVA</td>
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<tr>
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<td>S-510HQ</td>
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<td>10 ~ 400</td>
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<td>S-752</td>
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<td>400 ~ 1300</td>
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<td>S-755</td>
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<td>PVA / Nonionic</td>
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<td>SDX-5100</td>
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<td>100 ~ 400</td>
<td>4 ~ 7</td>
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<td>EVA – Vinyl chloride</td>
<td>S-801HQ</td>
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<td>S-830</td>
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<td></td>
<td>S-850HQ</td>
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<td>S-900HL</td>
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<td>PVA / Nonionic</td>
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<td>S-951HQ</td>
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<td>100 ~ 1000</td>
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<td>PVA / Nonionic</td>
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<td>S-955HQ</td>
<td>52</td>
<td>100 ~ 500</td>
<td>4 ~ 7</td>
<td>PVA / Nonionic</td>
<td>-</td>
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<td>Ethylene – Acryl</td>
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<td>6000 ~ 7000</td>
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<td>Special</td>
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<td></td>
<td>SE-1010</td>
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<td>50 ~ 150</td>
<td>4 ~ 9</td>
<td>Anionic</td>
<td>0.2</td>
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<tr>
<td></td>
<td>SE-1320</td>
<td>49</td>
<td>50 ~ 150</td>
<td>4 ~ 8</td>
<td>Anionic</td>
<td>0.2</td>
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</tbody>
</table>

* Minimum Film Forming Temperature

**Properties of powder**

- **Appearance**: RP-100S (White powder)
- **Volatile content [%]**: < 2
- **Powder particle size [μm]**: App. 70
- **Bulk density [g/cm³]**: App. 0.4
- **Viscosity [mPa.s]**: 2000
- **pH**: 5 ~ 6
- **MFT [°C]**: 0

**Main application**

- Construction (foundation adjuster, joint materials, finishing dressed lumber), civil engineering materials, polymer-improved agent, agrichemical spreading agent
Products Relationship of SUMIKAFLEX® and SUMIELITE®

- **HEC / Nonionic**
- **Water resistance**
- **510HQ**
- **EVA**
- **Polymer film**
  - **Hard**
  - **Soft**

**Cross-linking type**
- **752**
  - **EVA (Cross-linking)**
- **900HL**
  - **EVA-AC (Cross-linking)**
- **830**
  - **EVA-VC (Cross-linking)**
- **951HQ**
  - **EVA-VV (Reactive)**
- **850HQ**
  - **EVA-VC (Cross-linking)**
- **808HQ**
  - **EVA-VC**
- **801HQ**
  - **EVA-VC**

**Gas barrier**
- **1010**
  - **EVCL (Cross-linking)**
- **1320**
  - **EVCL (Cross-linking)**

**Abbr.**
- EVA : Ethylene-Vinyl acetate
- AC : Acrylate
- VV : Versatic acid vinyl ester
- VC : Vinyl chloride
- EVCL : Ethylene-Vinyl chloride

**400HQ**
- **EVA**
- **401HQ**
- **EVA**
- **408HQ**
- **EVA**
- **410HQ**
- **EVA**
- **450HQ**
- **EVA**
- **455HQ**
- **EVA**
- **456HQ**
- **EVA**
- **460HQ**
- **EVA**
- **467HQ**
- **EVA**
- **465HQ**
- **EVA**
- **470HQ**
- **EVA**
- **478HQ**
- **EVA**
- **483HQ**
- **EVA**
- **RP-100S**
- **EVA**
- **SDX-5100**
- **EVA**

**Sumikaflex®**
- Ethylene - vinyl acetate - acrylate copolymer emulsion
- Ethylene - vinyl acetate – versatic acid vinyl ester copolymer emulsion

**Sumikaflex®**
- Ethylene - vinyl acetate - vinyl chloride copolymer emulsion

**Sumiellite®**
- Ethylene - vinyl chloride copolymer emulsion
**About SUMIKAFLEX® and SUMIELITE® Products**

**Sumikaflex®** series is a product line of water based emulsions for various forms of polymer compositions, as typified by ethylene-vinyl acetate copolymer resins, ternary copolymer resins composed of ethylene, vinyl acetate, and vinyl chloride, and acrylic ethylene-vinyl acetate copolymer resins.

**Sumielite®** series is a product line of water based emulsions composed of ethylene-vinyl chloride copolymer resins.

A film formed from **Sumikaflex®** is highly adhesive, adequately strong and elastic, and furthermore, possesses excellent resistance to alkalis and water, and durability in particular, with unique polymer structures. A film formed from **Sumielite®** is highly transparent and glossy and has excellent resistance to water, solvents, and alkalis as well as good gas barrier property and durability. Along with these characteristics, the most distinctive characteristic of Sumielite® is its high flame retardance.

**The advantages of using ethylene as copolymerized monomer**

1. Excellent in plasticizing effect as an internal plasticizing monomer
2. A wide variety of polymer designing is possible with various sorts of other copolymerized monomers
3. Excellent in water and alkaline resistance
4. Excellent in weather resistance
5. Good affinity for non-polar materials such as plastics or synthetic fabrics

Our various products are used in wide application as shown in the right page. We are sure that these products must be of your help.

**Manufacturing process of EVA emulsion**

![Diagram of EVA emulsion process]

- Vinyl Acetate Water Emulsifier
- Ethylene
- Catalyst
- Degassing tank
- Storage tank
- Pre-mix tank
- Reaction tank
- Pump
- Filter

**Use example**

- **High molecular weight series**
  S-455HQ is used as adhesives for the sheet laminated plywood for interior materials.
  It has good heat resistance and organic solvent resistance because of the ultra high molecular weight. It’s noteworthy that S-455HQ has excellent heat resistant creeping property.
  * TIP: Toluene insoluble residue percent (polymer molecular weight index)

- **Self-crosslinking series**
  S-700 series of products are used as binder for, among others, non-woven pulp, fabrics, and filter products.
  It is available to improve the water resistance, heat resistance, and film strength because of its self-crosslinking property.

- **Vinyl Chloride co-polymerized series**
  S-800HQ series and Sumielite® series of products have high water resistance and flame retardancy by copolymerizing vinyl chloride.
  These products are used as binder for filter/fibers and as backing adhesives for carpets and mats for automobiles.

**Flame retardancy of each resin**

<table>
<thead>
<tr>
<th>Resin</th>
<th>LOI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-752</td>
<td>19.7</td>
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<tr>
<td>S-830</td>
<td>23.2</td>
</tr>
<tr>
<td>S-850HQ</td>
<td>23.7</td>
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<tr>
<td>SE-1010</td>
<td>24.6</td>
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<td>SE-1320</td>
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<td>SBR</td>
<td>17.8</td>
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<td>St-Acryl</td>
<td>18.1</td>
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<td>Acryl</td>
<td>17.5</td>
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</table>

LOI: Limited Oxygen Index
Functional Polymers Division

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■ Remarks
  The data and contents described in this document are based on our laboratory research and survey and are believed to be reliable enough, but we do not guarantee it.

■ Handling Precautions
  To prevent the contact to eyes, skin or clothes, wear the chemical safety goggles or glasses and impervious gloves. If you got eye contact, begin to rinse with water as soon as possible and rinse cautiously for over 15 minutes. If you got skin contact, gently wash with plenty of soap and water. In case of the storage, protect from freezing and direct sunlight, and avoid the long term storage. Please check the SDS of the each products to confirm the more information.