Chlorinated Polyethylene

ELASLEN™

Showa Denko America
Elastomer Group
TEL: 212–370–0033
E-mail: info@showadenko.us
About the company

- Company Name: SHOWA DENKO K.K.
- Type of Industry: Diversified Chemical Company
- Head Office: 13-9, Shiba Daimon 1-Chome, Minato-ku, Tokyo 105-8518 Japan
- Formed: June 1, 1939
- Capital: 140,564 million (as of December 31, 2011)
- Employee: 4,168 (in December 31, 2011)
- Net sales: 854 billions Yen (in 2011)
- Net income: 47 billions Yen (in 2011)
- Business Sectors: Petrochemicals, Chemicals, Inorganic Materials, Alminium, Electronics
Our CPE Business

- **Product Name**: ELASLEN®
- **Chemical Name**: Chlorinated Polyethylene
- **CAS Number**: 64754-90-1
- **HS code Number**: 3901.90.10
- **Start of Sales**: Oct.1968
- **Production Capacity**: 5000MT/Y
- **Plant Location**: Kawasaki City, Japan
- **Quality Control Program**: ISO 9002 (Registered in 1998)
- **Environmental Control Program**: ISO14001 (Registered in 1997)
WHAT IS ELASLEN?

- ELASLEN is the product name of our Chlorinated Polyethylene.

- ELASLEN is a thermoplastic polymer, which is manufactured by chlorinating high density polyethylene.

- ELASLEN has an excellent flexibility, weatherability, heat aging resistance, flame retardancy and chemical resistance.
Production Process

Chlorine gas → Reaction → Washing → Dehydration → Drying → Product

Aqueous slurry

Appearance: Powder
Package: 20kg Paper Bag
FCL: 14.4MT with pallet (0.9MT/pallet) 16.0MT without pallet
Chemical Structure

*Hydrogen is displaced by Chlorine at random.
## Applications

<table>
<thead>
<tr>
<th>Sector</th>
<th>Major Effect</th>
<th>Applicable Grades</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid PVC</td>
<td>Impact resistance, Processability</td>
<td>301AS, 351AYS</td>
<td>Modified Pipe Window Profiles</td>
</tr>
<tr>
<td>Flexible PVC</td>
<td>Low Temperature characteristics</td>
<td>301AS, 401AY</td>
<td>Cable jacket Insulating tape</td>
</tr>
<tr>
<td>FR ABS</td>
<td>Flame retardancy, Elimination of flame droplets</td>
<td>252B, 303BS 302NAC</td>
<td>FR ABS for UL94 V-0 grades</td>
</tr>
<tr>
<td>PE</td>
<td>Flame retardancy</td>
<td>402B, 404B</td>
<td>Cable jacket</td>
</tr>
<tr>
<td>Rubber</td>
<td>Chemical resistance, Filler acceptance</td>
<td>301AS, 401AY 351AYS, 302NAC</td>
<td>Magnetic rubber Automotive hose OA rollers</td>
</tr>
</tbody>
</table>
# ELASLEN for Rigid PVC

<table>
<thead>
<tr>
<th>Items</th>
<th>CPE</th>
<th>MBS</th>
<th>Acrylic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Properties</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact Strength</td>
<td>Good Excellent</td>
<td>Excellent Not Good</td>
<td>Good Not Good</td>
</tr>
<tr>
<td>Without Filler</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With Filler</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weather resistance</td>
<td>Good</td>
<td>Not Good</td>
<td>Excellent</td>
</tr>
<tr>
<td>Chemical resistance</td>
<td>Excellent</td>
<td>Not Good</td>
<td>Not Good</td>
</tr>
<tr>
<td><strong>Processability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque</td>
<td>Excellent (Low)</td>
<td>Not Good (High)</td>
<td>Not Good (High)</td>
</tr>
<tr>
<td><strong>Resin Temperature</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gelation</td>
<td>Slow</td>
<td>Fast</td>
<td>Fast</td>
</tr>
</tbody>
</table>
Three Factors of CPE

<table>
<thead>
<tr>
<th></th>
<th>Flame Retardancy</th>
<th>Oil &amp; Chemical resistance</th>
<th>Mechanical strength</th>
<th>Heat aging resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine Content</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
</tr>
<tr>
<td>Crystallization</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
<td>![Arrow]</td>
</tr>
</tbody>
</table>
## Comparison with other rubbers

<table>
<thead>
<tr>
<th>Item</th>
<th>CPE</th>
<th>CSM</th>
<th>CR</th>
<th>EPDM</th>
<th>NBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flame retardancy</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Poor</td>
<td>Poor</td>
</tr>
<tr>
<td>Oil resistance</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Poor</td>
<td>Excellent</td>
</tr>
<tr>
<td>Ozone resistance</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Fair</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
<tr>
<td>Weather resistance</td>
<td>Excellent</td>
<td>Good</td>
<td>Fair</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
<tr>
<td>Heat resistance</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Excellent</td>
<td>Fair</td>
</tr>
<tr>
<td>Electrical insulation</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Excellent</td>
<td>Fair</td>
</tr>
<tr>
<td>Coloring</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Poor</td>
<td>Fair</td>
<td>Poor</td>
</tr>
</tbody>
</table>
Various Grades
(Chlorine content vs Molecular Weight)

Molecular Weight
- Ultra High
- High
- Medium
- Low

Chlorine Content (wt%)
- 25
- 30
- 35
- 40

- Good Heat Resistance
- Good Low Temp Property
- Good Flame Retardancy
- Good Oil Resistance
- Good Mechanical Strength
- Good Processability
- Good Compatibility
Various Grades (Chlorine content vs Crystallization)

Cristallization

- 50J/g
- 40J/g
- 30J/g
- 20J/g
- 10J/g

Non-Crystallization < 2J/g

Chlorine Content (wt%)

- Good Heat Resistance
- Good Low Temp Property
- Good Flame Retardancy
- Good Oil Resistance
- Good Mechanical Strength
- Flexibility
- Good Filler acceptance

Sample Grades:

- 404B
- 303BS
- 351AYS
- 402NA
- 401AY
- 252B
- 302NAC
- 352GB
- 352NA
- 353A
- 402B
- 402NA
- 401AY
- 301AS
- 301MA
- 302NAC
- 351AYS