Showa Denko Chloroprene (CR) is a type of synthetic rubber used as an elastomer in the automotive (belts and hoses), construction (waterproofing and sealing), wire and cable, adhesives, and countless other industries. Showa Denko Chloroprene has been produced for over 50 years and continues to expand its application fields. The properties of Showa Denko Chloroprene is highlighted by the a wide range of resistances to sun, ozone, and weathering, many oils and chemicals, low and high temperatures, flame, and toughness against abrasion and general wear. The versatile properties have long been the key to Showa Denko Chloroprene’s utility as a multi-purpose rubber. The product is available in over 40 grades, produced as either a dry chip or aqueous dispersion (Latex).

What is Showa Denko Chloroprene?

**Polychloroprene Rubber**

### Well balanced elastomer CR

#### Elasticity

<table>
<thead>
<tr>
<th></th>
<th>CR</th>
<th>NR</th>
<th>SBR</th>
<th>NBR</th>
<th>EPDM</th>
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<tbody>
<tr>
<td></td>
<td>Poor</td>
<td>Excellent</td>
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#### Oxidation resistance

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<td></td>
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#### Heat resistance

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#### Oil resistance

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<td>Poor</td>
<td>Excellent</td>
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#### Low temperature resistance

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#### Compression set

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#### Gas transmission resistance

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#### Weather resistance

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#### Ozone resistance

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#### Abrasion resistance

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<td>Excellent</td>
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#### Insulation resistance

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<th>NBR</th>
<th>EPDM</th>
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<td></td>
<td>Poor</td>
<td>Excellent</td>
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#### Flame resistance

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<tbody>
<tr>
<td></td>
<td>Poor</td>
<td>Excellent</td>
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</tbody>
</table>

*These figures are only for reference purposes and therefore do not serve as specifications.*
Historical Overview

Location
Plant: Kawasaki, Japan

Footprints
1960: Established Showa Neoprene (Showa Denko 50%, DuPont 50%)
1963: Started Neoprene production at Kawasaki with DuPont technology
2002: Terminated JV and started CR business as Showa Denko

Process
1963: Started production with Acetylene process
1972: Converted to butadiene process, developed by DuPont, for safety concerns

Quality & Environment Management
ISO9001, ISO14001, OSHMS

Process (Butadiene)

- Butadiene
- Chlorine

Monomer Synthesis
- Dichlorobutene Synthesis and Refining Process
- Chlorobutadiene Synthesis and Refining Process

Polymerization
- Emulsification, Polymerization

Finishing & Packaging
- Drying Process
  - Dry: Paperbag (Skid/Pallet)
  - Latex: IBC/Tote, ISO Tank, Flexi-bag

Location
Plant: Kawasaki, Japan

Footprints
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Quality & Environment Management
ISO9001, ISO14001, OSHMS
Showa Denko Chloroprene latex grades are emulsions of polymerized chloroprene dispersed in water; containing emulsifying agents and stabilizers. The latex grades are viscous, off-white, liquids which range in solid content from 47% to 60%. Showa Denko chloroprene latex is available in over 15 different grades, each tailored to meet the requirements of specific end uses.

**Water-based adhesives**
- Foam to foam, Shoe sole bonding, Contact adhesive,
- High pressure laminate, Metal bonding

**Construction & Coating**
- Asphalt emulsion, Mortar modification,
- Water proof coating, Roofing

**Dipped goods**
- Surgical gloves, Industrial gloves, Medical breathing bags

**Others**
- Sealant, Mattress, Textile coating, Flame retardant foam

It is intended for use by persons having technical skill at their own discretion and risk. Do not use in medical applications involving permanent implantation in the human body. For other medical applications, discuss with your Showa Denko customer service representative.
Showa Denko Chloroprene is available in a dry chip form. There are around 30 dry grades that cover a wide range of properties and performance to meet the requirements from automobile, adhesive, construction and general rubber industry fields.

**Automotive**
- Transmission belt, Hose, Engine mount

**Industrial**
- Conveyor belt, Gasket, Boots seal, O-ring, Wire and cable

**Construction**
- Bearing pad, Joint, Rubber sheet

**Adhesive**
- Foam to foam, Carpet backing, High pressure laminate

**Others**
- Sponge, Escalator handrail, Mattress

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Since its foundation in 1939, Showa Denko K.K. has been one of Japan's leading chemical manufacturers. For more than 70 years we have responded to the changing needs from various markets by continuously developing new chemicals and products in close cooperation with our customers.

**Petrochemicals**
Olefins (ethylene and propylene) and organic chemicals (vinyl acetate monomer, ethyl acetate and allyl alcohol)

**Chemicals**
Functional chemicals, basic chemicals, industrial gases, high-purity gases, Polychloroprene (CR), and chlorinated polyethylene (CPE).

**Electronics**
Hard disks (HDs), compound semiconductors (LED chips), and rare earth magnetic alloys

**Inorganics**
Graphite electrodes and ceramics (alumina and abrasives)

**Aluminum**
Rolled products specialty components, and beverage cans

**Others**
Lithium-ion battery (LIB) materials, building products, and general trading
LATEX APPLICATION MAP BY CRYSTALLIZATION VS. GEL CONTENT

- **Fast Crystallization Rate**
  - Sol (Low)
  - Gel Content
  - Adhesives
    - SD100
    - SD78
  - Asphalt Modification
    - SD77S
    - SND57
    - SD81

- **Slow Crystallization Rate**
  - Sol (High)
  - Coating, Binder
    - 400
    - 572
  - Dipped Goods (Glove)
    - 571
    - 842A

- **Properties**
  - Cohesion ↑
  - Tensile strength ↑
  - Hardness ↑
  - Low temp. resist ↑
  - Dry tack ↑
  - Elongation ↑

- **Latex Application**

---

**Legend**
- **Coating, Binder**
- **Adhesives**
- **Asphalt Modification**
- **Dipped Goods (Glove)**
- **Sol (Low)**
- **Sol (High)**
- **Fast Crystallization Rate**
- **Slow Crystallization Rate**

**Key Numbers**
- 400
- 572
- 571
- 842A
- 671A
- AE101
- SD78
- 654
- 115
- 753
- 750
- 650
- 572
- 842A
**SHOWA DENKO CHLOROPRENE LIQUID DISPERSION PROPERTIES (Typical Values)**

<table>
<thead>
<tr>
<th>Grades</th>
<th>400</th>
<th>750</th>
<th>753</th>
<th>650</th>
<th>654</th>
<th>842A</th>
<th>671A</th>
<th>572</th>
<th>571</th>
<th>SND57</th>
<th>SD77S</th>
<th>SD100</th>
<th>SD78</th>
<th>AE101</th>
<th>115</th>
<th>SD81</th>
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<tbody>
<tr>
<td>Polarity</td>
<td>Anionic</td>
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<td>Anionic</td>
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<tr>
<td>Homopolymer/Co-Polymer</td>
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<td>Copolymer</td>
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<td>Homopolymer</td>
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<td></td>
</tr>
<tr>
<td>Main Feature</td>
<td>Ozone and weather resistance</td>
<td>Excellent flexibility</td>
<td>Low modulus</td>
<td>Fast curing</td>
<td>Good wet strength</td>
<td>Fast crystallizing</td>
<td>General purpose</td>
<td>Good tackiness</td>
<td>Water based adhesives for foam bonding</td>
<td>Water based adhesives for high pressure laminate</td>
<td>Water based adhesives for foam bonding</td>
<td>Water based adhesives for high pressure laminate</td>
<td>Water based adhesives for high pressure laminate</td>
<td>Non-ionic</td>
<td>Non-ionic</td>
<td>Non-ionic</td>
</tr>
<tr>
<td>Solids Content, %</td>
<td>49</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>60</td>
<td>59</td>
<td>50</td>
<td>50</td>
<td>58</td>
<td>55</td>
<td>55</td>
<td>60.5</td>
<td>60.5</td>
<td>59</td>
<td>47.5</td>
<td>46.5</td>
</tr>
</tbody>
</table>

**Primary Applications & Other Characteristics**

- Bonded fibers
- Coatings
- Anionic
- Adhesives
- Dipped goods
- Non-woven fabric
- Low modulus
- Excellent elasticity
- Accelerator free
- Dipped goods
- Adhesives
- Non-woven fabric
- Low modulus
- Fabric impregnation (Binder)
- Dipped goods
- Adhesives
- Bonded fibers
- Dipped goods
- Coatings
- Carpet backing
- Treated paper
- Adhesives
- Pressure sensitive adhesives
- Primer
- Adhesives
- Good quick break with excellent stability
- Adhesives
- Excellent quick break with decent stability
- Adhesives

**Physical Characteristics**

| pH, 25°C | 11.5 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 11.5 | 11.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.3 | 12.5 | 7 | 7 |
| Specific gravity, 25°C | 1.15 | 1.12 | 1.12 | 1.13 | 1.13 | 1.11 | 1.11 | 1.11 | 1.11 | 1.12 | 1.12 | 1.12 | 1.12 | 1.13 | 1.13 | 1.09 | 1.08 |
| Brookfield viscosity, mPa.s, 25°C (Spindle No.1, 30rpm) | 1.41 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 | 1.24 | 1.23 |
| Softening point, °C (Creeping temp) | 37 | 39 | 39 | 39 | 41 | 38 | 41 | 38 | 38 | 41 | 38 | 38 | 38 | 40 | 36 | 47 | 47 |

**Wet gel properties**

| Tensile strength | Very high | High | High | High | High | High | Medium | Medium | Medium | Very high | Medium | Medium | Medium | Low | Medium-high | Very high | Very high | Very high | High | High | High | Medium | Low |
| Elongation | Slow | Medium | Medium-fast | Medium | Medium | Medium | Fast | Medium-fast | Fast | Fast | Slow | Slow | Med-fast | Med-fast | Medium-slow | Slow |

**Cured Film Properties**

| Modulus | Very high | Low | Medium | Low | Medium | Low | Medium | Medium | Medium | High | Medium | Medium | High | Medium | High-medium | Medium | Low |
| Crystallization rate | Extremely fast | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow | Slow |

**Note:** *1) pH values decline slowly upon ageing.  *2) Spindle No.2

The information set forth herein is furnished free of charge and is based on technical data that Showa Denko K.K. believes to be reliable. It is intended for use by persons having technical skill, at their own discretion and risk. The handling precaution information contained herein is given with the understanding that those using it will satisfy themselves that their particular conditions of use present no health or safety hazards. Because conditions of product use and disposal are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of the information. As with any material, evaluation of any compound under and/or conditions prior to specification is essential. Testing herein is to be taken as a boater to operate or a recommendation to infringe on any patents. **CAUTION:** Do not use in medical applications involving permanent implantation in the human body. For other medical applications, discuss with your Showa Denko customer service representative. Showa Denko Chloroprene is a trademark of Showa Denko K.K.

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PLOT OF DRY GRADES CRYSTALLIZATION RATE VS. MOONEY VISCOSITY
# SHOWA DENKO CHLOROPRENE DRY GRADE PROPERTIES (Typical Values)

## GENERAL PURPOSE

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### Grades Other Characteristics

#### Type
- **G Types (Sulfur-modified group)**
  - GN: 42 – 59 Medium Non-staining, sulfur modified G type with best tear strength and flex resistance
  - GRT: 34 – 52 Medium Good low temperature properties, G type with best tack for frictioning application
  - GW: 34 – 52 Medium Sulfur modified G type with better heat and compression set resistance than GN

- **W Types (Basic group)**
  - W: 42 – 51 Medium Standard grade for general purposes
  - WM1: 34 – 41 Medium Lower viscosity version of W
  - WHV: 109 – 130 Medium Higher viscosity version of W for high loading application and general adhesives
  - WHV100: 95 – 105 * Medium Lower viscosity version of WHV

- **W Types (Adhesive application)**
  - WHV140: 100 – 150 Medium For high viscosity adhesive

- **W Types (Crystallization resistant group)**
  - WXJ: 42 – 51 Very Slow Good low temperature properties for general use
  - SND5: 67 – 76 Very Slow Higher viscosity version of WXJ
  - SND8: 32 – 37 Very Slow Lower viscosity version of WXJ
  - WRT: 42 – 51 Extremely slow Excellent low temperature properties
  - WD: 100 – 120 Extremely slow Higher viscosity version of W
  - WB: 42 – 51 Medium Excellent extrusion and calendering properties
  - WKK: 73 – 89 Very Slow Good low temperature properties with better extrudability
  - WKKT: 106 – 117 Very Slow Better extrusion version of WKK with improved mold release
  - SND37: 73 – 89 Very Slow Better extrusion version of WKK with improved mold release

- **W Types (Extrusion & calendering)**
  - WKK: 42 – 51 Very Slow Improved mold release version of WXJ with good mill-ability
  - SND35: 63 – 73 Extremely slow More excellent low temperature properties of WRT with improved mold release for injection molding goods
  - SND43: 78 – 88 Extremely slow Higher viscosity version of SND-25 with less shrinkage
  - SND45: 60 – 73 Extremely slow More excellent low temp. and improved brittleness temp. version of WRT with improved mold release for injection molding goods

- **W Types (Low mold fouling group)**
  - TK: 42 – 51 Medium Superior extrusion and calendering grade with good tensile properties
  - TW100: 85 – 102 Medium Higher viscosity version of TK for high loading use
  - SND22: 42 – 51 Very slow Good low temperature properties with better extrudability
  - SND45: 85 – 100 Very slow Higher viscosity version of SND-22 with better extruderability and extrusion-ability having collapse resistance

- **T Types (Specific group for extrusion, calendering)**
  - TW: 42 – 51 Medium Superior extrusion and calendering grade with good tensile properties
  - TW100: 85 – 102 Medium Higher viscosity version of TW for high loading use
  - SND22: 42 – 51 Very slow Good low temperature properties with better extrudability
  - SND45: 85 – 100 Very slow Higher viscosity version of SND-22 with better extruderability and extrusion-ability having collapse resistance

- **A Types (Adhesive application)**
  - AC: 31 – 43 * Very fast Adhesives and paints use with good breakdown properties
  - AD5: 10 – 35 * Very fast Low solution viscosity version of AD. Low VOC adhesive potential
  - AD: 33 – 46 * Very fast Adhesives and paints use with good solution viscosity stability
  - AD40: 76 – 115 * Very fast High solution viscosity version of AD
  - AP: 40 – 115 ** Slow Excellent hot bond strength, carboxylated
  - AG: 80 – 130 Medium-Slow Excellent sprayability, thixotropic

### Note
- * Brookfield viscosity of 5% raw polymer solution in toluene at 25 °C, [mPas]
- ** Brooksfield viscosity of 10% raw polymer solution in toluene/hexane (60/40 vol/vol) at 25 °C, [mPas]
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