MS(Modified Silicone) Polymer Sealant Technologies

www.alseal.com.au
Introduction

- Manufacturing, packaging & distribution of adhesive, sealant & waterproofing products
- ISO-9001 & ISO14001 certified
- Products exported to >70 countries
- Largest MS Polymer sealant/adhesive manufacturer in South East Asia
- OEM of global sealant/adhesive brands
Range of Products

Sealants
- MS Polymer Sealants
- Silicone Sealants
- Polyurethane (PU) sealants
- Acrylic Sealants
- Construction Adhesive
- Caulking materials
- RTV Gasket Maker
- Small joint sealant
- SSG Structural Silicone Sealant
- Insulating Glass sealant
- Duct Sealants
- Butyl Sealants

Adhesives
- Solvent Cement
- Epoxy adhesives
- Contact adhesives
- Spray Adhesives
- Super glue
- Household adhesives
- Anaerobic adhesives
- Automotive adhesives
- MS flooring adhesive
- PVAC (Wood Flooring) adhesives
- Vinyl Flooring adhesives

Waterproofing
- Bitumen emulsion coating
- Acrylic elastomeric coating
- Bitumen flashing tape
- SBR Latex
- Cement based

Others
- Putty Fillers
- Wood Fillers
- Butyl/Bitumem Tapes
- Primer
- Caulking /Sausage Guns
4 Factories In Malaysia
R & D Facilities

- R&D Laboratory
- Viscometer
- Rheometer
- Tensile Tester
- QUV Weathering Tester
- KF Titrator
Production Facilities
Sealant – Insignificant material?
Case Study 1: KLCC, Kuala Lumpur

Sealant crazed badly and lost functionality
Sealant – Insignificant material?  
Case Study 5: Starhill Gallery (retail mall), Kuala Lumpur

Silicone oil-staining issues caused unsightly façade
Sealant – Insignificant material?
Case Study 5: Starhill Gallery (retail mall), Kuala Lumpur
Case Study 6: UE Square Shopping Mall, Clark Quay, Singapore

Silicone oil-staining issues caused unsightly façade
Basic functions of sealants

• Sealing joints between building elements and accommodate movement

• Prevent ingress/egress of:
  – Water/Moisture/Snow
  – Noise – Acoustic Control
  – Heat/Fire
  – Air/Vapor/Smoke
  – Dust/Dirt
  – Light
  – Chemicals

• Improve aesthetics
Types of sealants

- Hybrid sealants
  - STPE(MS), STPU/SPUR, STP, SMP

- Polyurethane(PU) sealants (*old version of STPU*)

- Silicone sealants — *neural & acetic*

- Acrylic sealants

- Polysulfide sealants

- Others

*new advanced technologies*
MS POLYMER SEALANTS

- MS *(Modified Silicone/Silane)* Polymer sealants
  - a.k.a. Hybrid, STPE (Silyl Terminated Polyether), or SMP (Silyl Modified Polymer) sealants
- MS polymers are products of Kaneka Corporation Japan
- most used type of construction sealant in Japan
- Available in Japan since >30 years ago
- Combine the strengths of PU and silicone sealants without their inherent weaknesses

  - e.g. Better weathering characteristics than PU sealants, but without the odor and unpaintability problems of silicone sealants.
History of MS Polymer Sealants

1978
Started commercial production of MS Polymer in Japan

1997
Started commercial production of MS Polymer in Europe

2008
Started introduction of MS Polymer in SE Asia

2009
Started commercial production of MS Polymer in US

2010
Started marketing work as Kaneka Malaysia
Elastomeric Construction Sealant
Market trend in Japan

Year

Production

Total production

X10,000kl

Modified Silicone(MS)
Silicone
Polyurethane
Polysulfide
Acrylic
Butyl rubber
Acrylic urethane
Oil caulking
# ASTM C920 compliant

## Standard Specification for Elastomeric Joint Sealants

**Test Report No. 7191108038-MEC15/02-ED (221406823)**
dated 23 Oct 2014

**TUV SÜD**
PSB Singapore

## TEST RESULTS:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Staining And Colour Change</td>
<td>No staining and no colour change</td>
<td>The sealant shall not cause any visible staining on the top surface of a white cement mortar base</td>
</tr>
<tr>
<td>2. Extrudability</td>
<td>&gt;10 mil/min</td>
<td>Type-S (single component), grade NS (non-sag or gunnable sealant) shall have an extrusion rate time of not &lt; 10 mil/min</td>
</tr>
<tr>
<td>3. Rheological (Flow) Properties</td>
<td>Vertical displacement: 0 mm sag Horizontal displacement: No deformation</td>
<td>Grade NS (non-sag or gunnable sealant) shall have flow characteristics such that it does not sag &gt;4.8mm in vertical displacement and shall show no deformation in horizontal displacement (refers to Types II and IV sealants)</td>
</tr>
<tr>
<td>4. Indentation Hardness test piece 1, average test piece 2, average</td>
<td>31 32</td>
<td>T (traffic) sealant shall have a hardness reading of not &lt;25 or &gt;50 after being properly cured. NT (non-traffic) sealant shall have a hardness reading of not &lt;15 or &gt;50 after being properly cured</td>
</tr>
<tr>
<td>5. Tack-Free Time</td>
<td>No transfer of test specimen to the polyethylene film</td>
<td>There shall be no transfer of the sealant to the polyethylene film when tested at 72 hours</td>
</tr>
<tr>
<td>6. Adhesion &amp; Cohesion Under Cyclic Movement, Class 25</td>
<td>No bond failure</td>
<td>The total loss in bond and cohesion areas among the three specimens tested for each surface shall not be &gt;9 cm² with mortar substrates</td>
</tr>
<tr>
<td>7. Effects Of Heat Ageing On Weight Loss, Cracking And Chalking, average</td>
<td>0.8% No cracking and chalking</td>
<td>The sealant shall not lose &gt;7% of its original weight or show any cracking and chalking</td>
</tr>
<tr>
<td>8. Effects Of Accelerated Weathering</td>
<td>No cracks after UV exposure and bend test</td>
<td>The sealant shall show no cracks after the specified UV exposure and shall show no cracks after exposure at cold temperature and the bend test</td>
</tr>
<tr>
<td>9. Adhesion-In-Peel, average</td>
<td>33.0 N (7.4 lbf) cohesive failure within the sealant and no adhesive bond loss between sealant and substrate for each test piece</td>
<td>The peel strength for each individual test shall not be &lt;22.2 N (5 lbf) and the sealant shall show no &gt;25% adhesive bond loss for each individual test</td>
</tr>
<tr>
<td>10. Material Identification/ Verification By FTIR</td>
<td>MS Polymer-based material (refer to Figure 1)</td>
<td>-</td>
</tr>
</tbody>
</table>
MS Polymer Sealant Application 1/5 (AS-4001)

Precast Concrete Wall Panel Joints
MS Polymer Sealant Application 2/5 (AS-4001)
Concrete Joints
(Construction, Expansion, Contraction, Control, Isolation Joints etc.)
MS Polymer Sealant Application 3/5 *(AS-4001)*
Door/Window Perimeter Joint
(gap between door/window aluminum/PVC frame and concrete wall)
Premier Construction Sealant

Features:
- Excellent weatherability – 10-year warranty
- ASTC C920 (Class 50) compliant
- Paintable
- Low static charge – Less fluid-streaking
- No silicone oil – Non-staining on adjacent substrates
- No isocyanate – No blistering
- No solvent – No shrinkage
- Bonds most substrates without primer
- Matte finish

Product Specifications:

- **Curing system**: Moisture curing
- **Density**: 1.52 – 1.54 g/mL
- **Tack-free time**: 30 - 60 minutes
- **Tensile strength (ASTM D412)**: ≥0.7 N/mm²
- **Elongation at break (ASTM D412)**: ≥600 %
- **Movement capability (ASTM C719)**: ±56 %
- **Shore A hardness (ASTM D661)**: 25 – 30
- **VOC content (US EPA Method 24)**: ≤94 g/L
- **Application temperature**: 5°C – 40°C
- **Service temperature**: ≤30°C - 100°C
- **Shelf life**: 9 months (cartridge), 12 months (sausage)

Description: A one-component, elastomeric joint sealant formulated with acrylic modified hybrid polymer. The weatherability and UV resistance of the sealant is excellent, with much longer expected service life than other organic sealants in the market. The finishing is matte, less tacky, and with low electrostatic charge, thereby reducing fluid-streaking issues on façade cladding caused by airborne dust particles. Besides, the formula is free of silicone oil, minimizing oil-staining or other building aesthetic issues caused by migration of silicone oil. Unlike polyurethane sealants, this sealant is free of isocyanate and solvent and thus no issues like blistering or shrinkage will occur. It also can adhere well to numerous substrates without primer, fast curing, paintable with common water-based coatings, and is a green product that complies with SOLAS rule #1168 Low VOC limit.

Applications: Specially formulated to seal metal (e.g., steel) and stone (e.g., granite) façade cladding due to its excellent weatherability and non-staining/less fluid-streaking characteristics. It is also recommended for sealing concrete joints like precast wall panel joints, construction joints, expansion joints, and window frame perimeter sealing (PVC / Aluminium to concrete wall), both painted and non-painted surfaces. Other recommended applications include sealing of masonry, brickworks, oxidized aluminum, stainless steel, porcelain, finished wood, coated metal, epoxy and polyester panels, metal, and many difficult substrates.

Limitations: Not recommended for constant water immersion, outdoor glass sealing, sealing substrates such as PE, PP, Teflon, Neoprene, and bitumen. Not paintable with alkyd paints.

Available colors: Matte black, matte grey & matte white

Content: 290 ml (cartridge), 600 ml (sauce)
Carton quantity: 29 cartridges / carton, 20 sausages / carton
MS Polymer Sealant Application 4/5 (AS-4002)
Metal Panel Façade Cladding (e.g. ACP)
MS Polymer Sealant Application 5/5 (AS-4002)  
Stone Façade (e.g. marble, granite, limestone)
# MS Polymer Sealant Applications in Constructions

<table>
<thead>
<tr>
<th>PU Sealant Replacement</th>
<th>Silicone Sealant Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete joints</td>
<td>• Weather seal</td>
</tr>
<tr>
<td></td>
<td>○ Metal Panels (ACP)</td>
</tr>
<tr>
<td></td>
<td>○ Natural Stone</td>
</tr>
<tr>
<td>Control/Expansion/Isolation/Construction Joints etc.</td>
<td></td>
</tr>
<tr>
<td>Precast Wall Panel Joints</td>
<td></td>
</tr>
<tr>
<td>Door/Window frame perimeter sealing</td>
<td></td>
</tr>
</tbody>
</table>
Good Weather / UV Resistance

much better than Polyurethane (PU) sealants!
Problem of PU sealants
Bad UV resistance - Cracking problem

ASTM C 1442-06 (QUV test)
Standard Practice for Conducting Tests on Sealants Using Artificial Weathering Apparatus
QUV chamber with fluorescent UVA-340 lamps. To determine the effects of actinic radiation, elevated temperature, and moisture on sealants and their constituents under controlled laboratory artificial weather test conditions.
ASTM C 1442-06 (QUV test)
Test result after 9,000 QUV hours (Appx. 9 years of actual weather),
PU sealant specimen (left) cracked badly
(and lost its designed functionality)
MS sealant specimen (right) remained good.
MS sealant QUV test result
After >20,000 QUV hours (abt 20 years of actual weather)
Observed on 25/10/214, test started 14/05/2012
Problem of PU sealants
Bad UV resistance - cracking problem
Cracked PU (Polyurethane) Sealant (Window Perimeter Joint)
Problem of PU sealants
Bad UV resistance - cracking problem

Cracked PU(Polyurethane) Sealant
(Window Perimeter Joint)
Problem of PU sealants
Bad UV resistance - cracking problem
No Bubbling

Which is a common problem of Polyurethane (PU) sealants!

- The bubbles/foams/blisters in PU sealants are due to the formation of $CO_2$.
- The formation of $CO_2$ is the result of the reaction of the isocyanate with moisture.
- Polyurethane sealants contain isocyanate
- MS Polymer sealants do not contain isocyanate
Problem of PU sealants
Bubbling

Bubble - formation of $\text{CO}_2$, result of the reaction of the isocyanate with moisture during curing of PU sealants
Problem of PU sealants
Bubbling
Problem of PU sealants
Bubbling

*Can cause cohesive failure of sealant over time (sealant bead breaks within itself)*
Damp Substrate Bonding/Sealing

- Applying sealants before or after rain?
- Taboo of polyurethane (PU) sealants!
No Shrinkage After Cure

because MS Polymer sealants do not contain solvent or water

unlike Polyurethane/Acrylic sealants, which can contain solvent/water that evaporates during curing process and causes shrinkage!
Problem of PU sealants
Shrinkage After Cure
PU Brand “A”  Shrink and paint cracked

PU Brand “B”  Shrink and recessed

Our MS Sealant  No shrinkage problem
Excellent Mechanical Performance

- Elongation at Break (>600% ASTM D412)
- Movement Capability (±50%, ASTM C719)

They matter for working joints!
AS-4001 – ASTM C719 COMPLIANT
TEST METHOD FOR ADHESION AND COHESION OF ELASTOMERIC JOINT SEALANTS UNDER CYCLIC MOVEMENT (HOCKMAN CYCLE)

Test Report No. 7191108038-MEC15/01-ED (221406823)
dated 23 Apr 2014

Cyclic Test Conditions:
Stage A - 10 cycles of joint movements:
   a) The joint width was compressed from 12.7mm to 6.4mm at 3.2 mm/h
   b) It was extended from 6.4mm to 19.1mm at 3.2 mm/h
   c) It was compressed again from 19.1mm to 12.7mm at 3.2 mm/h
Stage B - 10 cycles of joint movements:
   a) The joint width was compressed to 6.4mm and conditioned at 70°C for 16 to 20 hours
   b) After ageing, the test specimens were cooled to 23°C for 2 to 3 hours
   c) The joint width was extended to 19.1mm at -26°C and 3.2 mm/h
   d) The specimens were removed and allowed to condition to room temperature
No. of determinations : 3 for Class 50

CONDITIONING:
Unless otherwise specified, all test specimens were tested at 23 ± 2°C and 65 ± 5% relative humidity.

TEST RESULT:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesion &amp; Cohesion Under Cyclic Movement, Class 50</td>
<td><strong>No bond failure</strong></td>
<td>The total loss in bond and cohesion areas among the three specimens tested for each surface shall not be &gt;9 cm² with mortar substrates</td>
</tr>
</tbody>
</table>
Shorter Curing Time

*PU sealants* generally have longer skinning/curing time, hence more susceptible to issues like:

- dirt pickup and raindrop damage before skin forming
- adhesion/cohesion failure occurs due to joint movement before sealant fully cures
Green Product

No hazardous materials

\textit{like isocyanate \& solvent.}

<4\% of VOC(Volatile Organic Compound) contents
-Complies to SCAQMD rule 1168 (AS-4001)

AS-4005 - SGBPLS certified
CERTIFICATE OF ANALYSIS

ALSEAL MARKETING SDN. BHD.
Lot 2291, Jalan Kampung Baru,
Kg. Baru Sungai Buloh,
47000 Selangor, Malaysia.
Tel: +603-61579698* Fax: +603-61578002

Certificate No : CN/nCML0080/0215
Sample Log Code : nCML0074/0215
Sample Received Date : 17-Feb-2015
Complete Analysis Date : 02-Mar-2015
Date Issue : 02-Mar-2015

Sample Description : AS-4001 MS Construction Sealant
Analysis results :

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Analysis Result</th>
<th>Standard Method/Technique/Equipment Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC Test</td>
<td>g/L</td>
<td>ND(&lt;10)</td>
<td>USEPA Test method 24 and SCAAQMD Method 303-91 and using equations set out in L.N. 107 of 2009 Air Pollution Control (VOC) (Amendment) Regulation 2009</td>
</tr>
</tbody>
</table>

* ND denotes not detected
< Numeric number > denotes detection limits
Good paintability on cured sealant (water based paint)

<table>
<thead>
<tr>
<th>Sealant</th>
<th>waterborne acrylic paint</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td><strong>MS SEALANT</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SILICONE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>POLYSULFIDE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>POLYURETHANE</strong></td>
<td></td>
</tr>
</tbody>
</table>

**MS SEALANT’S PAINTABILITY IS EXCELLENT**
Good Workability

- 1-pass tooling
- No soap water or water required

** Save time
** No skillful workers required
MS POLYMER SEALANTS — ADVANTAGE 10/12

Less “Fluid Streaking” on Metal Facade Cladding

- Because of lower electrostatic charge (5-8 times lower than silicone sealants) that attracts less air-borne dust
- Because there is no “silicone oil”, like that contained in silicone sealants
ASTM D4470 -Standard Test Method for Static Electrification:
Silicone sealants have 5-8 times higher electrostatic charge than MS Polymer Sealants – and will pick up more air-borne dusts

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Color</th>
<th>Product category</th>
<th>Max. Electrostatic Charge (KV), ASTM D4470*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF1105 (Kaneka’s lab sample)</td>
<td>White</td>
<td>MS sealant</td>
<td>0.154</td>
</tr>
<tr>
<td>SR A</td>
<td>White</td>
<td>1K silicone sealant</td>
<td>0.887</td>
</tr>
<tr>
<td>SR B</td>
<td>Gray</td>
<td>1K silicone sealant with non-stone staining feature</td>
<td>1.130</td>
</tr>
</tbody>
</table>

* Data obtained by Trace Laboratories, Inc. MD, USA
* Sample size: 150mm x 150mm x 3mm

**Comments**
- SR shows relatively higher electrostatic charge.
- The fact that SR (Silicone) shows dirt streaking when used for building joint sealant is said to be caused by high electrostatic charge.
- Particularly, SR B, supposed to be best non-staining SR available showed highest electrostatic charge.
Migration

* Dirt Streaking
* Hydrophobic

Silicone oil

Static Electricity

Dust in the air

Silicone oil

SR Joint

By Rain

Dirt Pick Up

Dirt Streaking
Fluid-Streaking Test on Aluminum Composite Panels
MS VS Silicone

Comparison Sealants
– Before on 29th November 2011
Fluid-Streaking Test on Aluminum Composite Panels
MS VS Silicone

Comparison Sealants on Dirt Streaking issue
– After 1 year plus since November 2011

*Latest observed was on 4th March 2013*
Fluid-Streaking Test on Aluminum Composite Panels
MS VS Silicone

Sealant specimens applied on panels in September 2013

MS
Silicone A
Silicone B
Fluid-Streaking Test on Aluminum Composite Panels
MS VS Silicone

After 5 months – ‘fluid streaking’ observed on panels applied with silicone sealants but not the one with MS
Case Study: Tiong Nam Industrial Park, PJ, Selangor, Malaysia
ACP cladding of 18 units of factories sealed with MS Polymer sealant
**images taken in November 2013**
Case Study: Tiong Nam Industrial Park, PJ, Selangor, Malaysia
ACP cladding of 18 units of factories sealed with MS Polymer sealant
**images taken in Jun 2016 (after >30 months)
– no significant fluid streaking issues observed on ACP panels of ALL factories
Case Study: A Factory in Sungai Buloh, Malaysia
ACP cladding with serious fluid streaking issues (caused by silicone sealant) was cleaned up and then re-sealed with MS Polymer sealant

**images taken in Jun 2014**
Case Study: A Factory in Sungai Buloh, Malaysia
ACP cladding with serious fluid streaking issues (caused by silicone sealant) was cleaned up and then re-sealed with MS Polymer sealant
** images taken in Jun 2016 (after >24 months)
– no significant fluid streaking issues observed on ACP panels
Stable Storage
/Sheelf Life

PU sealants are bad in heat resistance and unstable in storage/shelf life
Competitive Pricing

comparable with PU and silicone sealants,
and very competitive against
hybrid sealants of other brands
Silyl Terminated Construction Sealants

SpecialChem | Edward M Petrie - Aug 26, 2009

<table>
<thead>
<tr>
<th>Property</th>
<th>MS Polymer</th>
<th>Polyurethane</th>
<th>Silicone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental friendliness</td>
<td>10</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Non-bubbling</td>
<td>10</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Low temperature gunnability</td>
<td>10</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Slump resistance</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Quick cure</td>
<td>10</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Storage stability</td>
<td>10</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Body (tooling)</td>
<td>8</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Weather resistance</td>
<td>8</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Adhesion to various substrates</td>
<td>10</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Mechanical properties</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Heat resistance, mechanical stability</td>
<td>9</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Non-dirt pickup</td>
<td>10</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Stain resistance</td>
<td>8</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Paintability with water-based paint</td>
<td>10</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 2: Performance Comparison of MS, Polyurethane, and Silicone Sealants

Sources:
http://www.adhesives.org/docs/default-document-library/hybrid_sealants_may2010-final-(1).pdf
http://www.specialchem4adhesives.com/resources/articles/article.aspx?id=3042
Sealant Cost Is Insignificant In Overall Project Cost, But When Sealant Fails, It Fails Big Time!

- Adhesive/cohesive failure causes water leakage and units unlivable
- Stained/Streaked stone/metal panel façade causes unsightly aesthetic issues and high maintenance fee
- Very significant cost, time, and effort required to identify and repair failed sealant (especially sealant applied at external wall of high floors!)

So why still use PU sealants which are known to have short service life (3-10 years), and silicone sealants, which will stain/streak the building façade??
Project Reference
MS Polymer Sealant

- Project Name: Bayport West (Naia Garden Residences)
- Project Type: Condominium
- Location: Manila, Philippines
- Application: Precast Wall Panel Joint
- Owner: Mega Pacific Property Holdings & Dev't Corp.
- Main Contractor: One Asia Builders
- Year: 2015

- Project Name: Conrad Manila Bay Hotel
- Project Type: Hotel
- Location: Manila, Philippines
- Application: Precast Wall Panel Joint
- Year: 2016
Project Reference
MS Polymer Sealant

- Project Name: **Torre Sur**
- Project Type: Condominium
- Location: **Philippines**
- Application: Precast Wall Panel Joint
- Owner: Torre Lorenzo Development Corp.
- Main Contractor: ASEC Development and Construction Corp.
- Year: 2015

- Project Name: **Twin Oaks Place**
- Project Type: Condominium
- Location: **Philippines**
- Application: Precast Wall Panel Joint
- Owner: Greenfield Development Corporation
- Main Contractor: MB Technosolutions Corporation
- Year: 2015
Project Reference
MS Polymer Sealant

- Project Name: Sunpower Plant
- Project Type: Manufacturing plant
- Location: Laguna, Philippines
- Application: Precast Wall Panel Joint
- Year: 2016

- Project Name: The Florence
- Project Type: Condominium
- Location: Fort Bonifacio, Taguig City, Philippines
- Application: Precast Wall Panel Joint
- Year: 2016
Project Reference
MS Polymer Sealant

• Project Name: **SMC Plant**
• Project Type: Factory Building
• Location: **Dong nai, Vietnam**
• Application: Various building joints
• Year: 2017
Project Reference
MS Polymer Sealant

- Project Name: Vivo City
- Project Type: Shopping Mall
- Location: Singapore
- Application: Expansion Joint
- Year: 2016
Project Reference
MS Polymer Sealant

• Project Name: Gateway Shopping Centre
• Project Type: Shopping Mall
• Location: Yarrawonga, Australia
• Application: perimeter sealing, expansion joint
• Year: 2017
Project Reference
MS Polymer Sealant

- Project Name: Festiwal Walk
- Project Type: Shopping Mall
- Location: Kowloon, Hong Kong
- Application: Expansion joint
- Year: 2016

- Project Name: Pak Fook Building
- Project Type: Commercial Building
- Location: Wan Chai, Hong Kong
- Application: Expansion joint
- Year: 2017
**Project Reference**

**MS Polymer Sealant**

- **Project Name:** Soho Suites
- **Project Type:** Condominium
- **Location:** KLCC area, KL, Malaysia
- **Application:** Window Perimeter Sealing
- **Developer:** Monoland
- **Sub Contractor:** Signature Aluminum
- **Year:** 2013

- **Project Name:** Quadro Residences
- **Project Type:** Condominium
- **Location:** KLCC area, KL, Malaysia
- **Application:** Window Perimeter Sealing
- **Developer:** Monoland
- **Sub Contractor:** Signature Aluminum
- **Year:** 2013
Project Reference
MS Polymer Sealant

• Project Name: The Mansion
• Project Type: Bungalow
• Location: Desa Park City, KL, Malaysia
• Application: Window Perimeter Sealing
• Developer: Perdana Parkcity
• Sub Contractor: Alumeco
• Year: 2013

• Project Name: The Breezeway
• Project Type: Terrace & Condo
• Location: Desa Park City, KL, Malaysia
• Application: Window Perimeter Sealing
• Developer: Perdana Parkcity
• Sub Contractor: Alumeco
• Year: 2013
Project Reference

MS Polymer Sealant

- **Project Name:** 28 Mont Kiara
- **Project Type:** Condominium
- **Location:** Mont Kiara, KL, Malaysia
- **Application:** Window Perimeter Sealing
- **Developer:** Sunrise
- **Sub Contractor:** Alumeco
- **Year:** 2012

- **Project Name:** The Greens
- **Project Type:** Condominium
- **Location:** Kuala Lumpur
- **Application:** Window Perimeter Sealing
- **Developer:** Bellworth
- **Sub Contractor:** LDE Aluminum
- **Year:** 2015
Project Reference

MS Polymer Sealant

- Project Name: The Fennel @ Sentul East
- Project Type: Condominium
- Location: Sentul, Kuala Lumpur
- Application: Wall Termination Joint
- Year: 2016

- Project Name: Banyan Tree Signatures
- Project Type: Serviced Residence
- Location: KL, Malaysia
- Application: Wall Termination Joint
- Developer: Pavilion Group
- Sub Contractor: Angkasa Jasa
- Year: 2016
Project Reference
MS Polymer Sealant

- Project Name: **Second Penang Bridge**
- Project Type: Bridge
- Location: **Penang, Malaysia**
- Application: Bridge Girder Expansion joint
- Year: 2013

- Project Name: **Seri Jati**
- Project Type: Apartment (IBS)
- Location: **Selangor, Malaysia**
- Application: Precast Wall Panel joint
- Developer: SP Setia
- Main Contractor: Setia Precast
- Sub Contractor: Infocast Triangular
- Year: 2014
Project Reference
Premier MS Polymer Sealant

- Name: **Southkey Mosaic**
- Project Type: Commercial Buildings
- Location: **Johor Bahru, Malaysia**
- Application: ACP
- Sub Contractor: Seng Hiap Glass
- Year: 2016

- Project Name: **KULIM LANDMARK CENTRAL**
- Project Type: SHOPPING MALL
- Location: **KULIM, MALAYSIA**
- Application: ACP
- Year: 2017
Project Reference
Premier MS Polymer Sealant

- Project Name: **Robinson Lifestyle Mall**
  - Project Type: Shopping Mall
  - Location: **Lopburi, Thailand**
  - Application: ACP Metal Cladding
  - Year: 2016

- Name: **The Prio Condo**
  - Project Type: condominium
  - Location: **Chiang Mai, Thailand**
  - Application: ACP
  - Year: 2016
Project Reference
Premier MS Polymer Sealant

- Project Name: NagaWorld
- Project Type: Mall/Casino/Hotel
- Location: Cambodia
- Application: ACP Metal Cladding
- Year: 2014
Thank You

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