

Advanced MS Polymer



AS-4001 / AS-4001S

# MS Construction Sealant



## Features:

- ASTM C-920 Compliant
- ±50% Movement Capability
- Paintable
- Less Dirt Streaking
- No Air Bubbling
- No Shrinkage
- Good UV Resistance
- Solvent, Silicone & Isocyanate Free
- Primerless Bonding to Most Surfaces

## PRODUCT SPECIFICATION:

|                                       |                                                           |
|---------------------------------------|-----------------------------------------------------------|
| Curing System                         | Moisture Curing                                           |
| Density                               | 1.56 g/ml (White & Grey color)<br>1.55 g/ml (Black color) |
| Tack Free Time                        | 45-55 minutes                                             |
| Elongation at break (ASTM D412)       | > 900%                                                    |
| Shore A Hardness (ASTM C661)          | 25 - 35                                                   |
| VOC content (USEPA Test Method 24)    | <10g/L                                                    |
| Joint movement capability (ASTM C719) | ±50%                                                      |
| Application Temperature               | 5°C to 40°C                                               |
| Service Temperature                   | -30°C to 100°C                                            |
| Shelf Life                            | 9 months (Cartridge)<br>12 months (Sausage)               |



## Description:

A single-component, high-performance hybrid sealant based on advanced MS Polymer technology. It is solvent, silicone and isocyanate free. Its characteristics of UV, weather and temperature resistance are excellent. The adhesion of the sealant on a wide variety of substrates is great, and it is paintable with most types of common industrial paints.

## Applications:

Recommended for sealing concrete joints like expansion joints, construction joints, wall panel joints etc. Ideal for sealing metal or stone facade panels, and door/window frame perimeter joints. It may also be used without primer to seal porcelain, coated metal, epoxy and polyester panels, polystyrene, uPVC, stainless steel, anodized aluminum and finish wood.

## Limitation:

Not recommended for areas subject to continuous water immersion. Not for PE, PP, Teflon, Neoprene, and bituminous surfaces. Not for outdoor sealing/bonding of glass substrates. Not paintable with Alkyd resin paint because curing inhibition of the paint.

Available Colors: White, Grey & Black

Content: 290ml (cartridge), 600ml (sausage)

Carton Quantity: 20 cartridges/carton, 20 sausages/carton



## Features:

Paintable



✓ Paintable (MS Polymer)



Non-paintable (Silicone Sealant)

Flexible Seal & Good UV Resistance



✓ Good UV Resistance (MS Polymer)



Poor UV Resistance - Sealant Cracking (PU Sealant)

Non Staining / Less Dirt Streaking



✓ Less Dirt Streaking (MS Polymer)

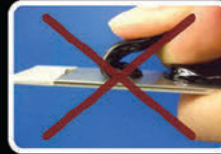


Streaking (Silicone Sealant)

Primerless Bonding to Most Substrates

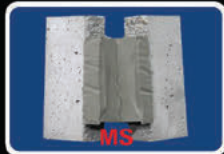


Cohesive Failure (MS Polymer)



Adhesive Failure (Silicone Sealant)

No Air Bubbling



✓ No Air Bubbling (MS Polymer)



Bubbling (PU Sealant)

Green Sealant



✓ Green Sealant (MS Polymer)



Hazardous Materials (PU Sealant)

### PAINTABLE

- Paintable with various types of paints.

### GOOD UV RESISTANCE

- $\pm 50\%$  movement capability, suitable for working joints that experience significant movements.
- Good UV resistance and durable, remain elastomeric for long time.

### NON STAINING / LESS DIRT STREAKING

- No silicone oil, hence no oil migration and staining issues on adjacent substrates.
- Minimize dirt-streaking issues introduced by silicone sealants.
- Reduce building cleaning and maintenance costs.

### PRIMER LESS BONDING

- Good adhesion to most substrates even without using primer.
- Works on difficult-to-bond substrates like aluminum, stainless steel, polycarbonate, ABS, PVC, etc.

### NO AIR BUBBLING

- 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 sealants do not contain isocyanate.

### GREEN SEALANT

- $< 10g/L$  of VOC (Volatile Organic Compound) contents. (USEPA Method 24)
- Complies to SCAQMD rule 1168.
- No hazardous materials such as isocyanate, solvent, heavy metals, etc.

## Applications:



Distributed by:

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|                                                                                   |                                        |                                                                                    |                                                      |
|-----------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------|
|  | <b>ALSEAL MARKETING SDN. BHD.</b>      |  | <b>Issued Date: 14/02/15</b>                         |
|                                                                                   | <b>Technical Data Sheet</b>            |                                                                                    | <b>Revision No.: 2</b>                               |
|                                                                                   | <b>AS-4001 MS Construction Sealant</b> |                                                                                    | <b>Revised Date: 27/05/15</b><br><b>Page: 1 of 2</b> |

### **Product Specification:**

|                                           |                                                             |
|-------------------------------------------|-------------------------------------------------------------|
| Curing System                             | Moisture Curing                                             |
| Density                                   | 1.56 g/mL (White & Grey colour)<br>1.55 g/mL (Black colour) |
| Tack Free Time                            | 45 - 55 minutes                                             |
| Tensile at break (ASTM D412)              | 1.0 N/mm <sup>2</sup>                                       |
| Elongation at break (ASTM D412)           | >900%                                                       |
| Lap Shear Strength, Al to Al (ASTM D1002) | 0.5 N/mm <sup>2</sup>                                       |
| Shore A Hardness (ASTM C661)              | 25 - 35                                                     |
| VOC content (USEPA Test Method 24)        | < 10g/L                                                     |
| Joint movement capability (ASTM C719)     | ±50%                                                        |
| Application Temperature                   | 5°C to 40°C                                                 |
| Service Temperature                       | -30°C to 100°C                                              |
| Packaging                                 | 290ml (cartridge), 600ml (sausage)                          |

### **Features**

1. ASTM C-920 Compliant
2. ±50% Movement Capability
3. Paintable
4. Less Dirt Streaking
5. No Air Bubbling
6. No Shrinkage
7. Good UV Resistance
8. Solvent, Silicone & Isocyanates Free
9. Primerless Bonding to Most Surfaces



### **Product Description:**

A single-component, high-performance hybrid sealant based on advanced MS Polymer technology. It is solvent, silicone and isocyanate free. Its characteristics of UV, weather and temperature resistance are excellent. The adhesion of the sealant on a wide variety of substrates is great, and it is paintable with most types of common industrial paints.




### **Applications:**

Recommended for sealing concrete joints like expansion joints, construction joints, wall panel joints etc. Ideal for sealing metal or stone facade panels, and door/window frame perimeter joints. It may also be used without primer to seal porcelain, coated metal, epoxy and polyester panels, polystyrene, uPVC, stainless steel, anodized aluminum and finish wood.

### **Directions:**

1. Surfaces must be clean, dry and free of dirt, grease, oil or water.
2. For a neat finish, apply masking tape and remove it before sealant skins over.
3. Cut tip off and puncture the internal foil seal with nozzle. Cut nozzle at 45° angle to desired bead-width and apply to substrate with cartridge gun.
4. Tooling time is 30 minutes, tack free time is 45 minutes.
5. Uncured sealant can be cleaned up with mineral spirits.
6. Use approved backing material for joints over 10mm deep.



|                                                                                   |                                        |                                                                                                                                                                                                                                      |                                                      |
|-----------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
|  | <b>AL SEAL MARKETING SDN. BHD.</b>     |  <br><small>ISO 9001:2008<br/>Certificate No. QAMYS-0085</small> | <b>Issued Date: 14/02/15</b>                         |
|                                                                                   | <b>Technical Data Sheet</b>            |                                                                                                                                                                                                                                      | <b>Revision No.: 2</b>                               |
|                                                                                   | <b>AS-4001 MS Construction Sealant</b> |                                                                                                                                                                                                                                      | <b>Revised Date: 27/05/15</b><br><b>Page: 2 of 2</b> |

### Limitation:

- Not recommended for areas subject to continuous water immersion.
- Not for PE, PP, Teflon, Neoprene, and bituminous surfaces.
- Not for outdoor sealing/bonding of glass substrates.
- Not paintable with Alkyd resin paint because curing inhibition of the paint.
- It should not be used in trafficable joints greater than 10mm width. For trafficable joint above 10.0mm width, a steel cover plate is required.

### Caution:

- Uncured adhesive / sealant causes skin and eyes irritation upon contact.
- Avoid contact with eyes, skin and mouth.
- In case of contact with eyes, flush with water immediately for 15 minutes. If irritation persists, seek medical attention.
- Keep out of reach of children. Use in well ventilated areas.
- EUH208-Contains 3-(2-Aminoethylamino)propyltrimethoxysilane. May produce an allergic reaction.



### Storage

- Store in a dry and cool place with temperature below +25°C.
- From the date of production, 9 months in HDPE cartridge; and 12 months in aluminium foil sausage.

Every endeavour has been made to ensure that the information given herein is true and reliable but it is given only for the guidance of our customers. The company cannot accept any responsibility for the loss or damage that may result from the use of the information, due to the possibility of various of processing or working conditions and of workmanship outside our control. Users are advised to confirm suitability of this product by their own tests.

- END -



|                                                                                   |                                        |                                                                                    |                               |
|-----------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------|-------------------------------|
|  | <b>ALSEAL MARKETING SDN. BHD.</b>      |  | <b>Issued Date:</b> 14/02/15  |
|                                                                                   | <b>Material Safety Data Sheet</b>      |                                                                                    | <b>Revision No.:</b> 1        |
|                                                                                   | <b>AS-4001 MS Construction Sealant</b> |                                                                                    | <b>Revised Date:</b> 01/04/15 |
|                                                                                   |                                        |                                                                                    | <b>Page:</b> 1 of 4           |

## 1. Identification of the substance/preparation and of the company/undertaking

**Product name :** AS-4001 MS Construction Sealant

**Company :** Aseal Marketing Sdn Bhd  
 Lot 2291, Jalan Kampung Baru,  
 Kg. Baru Sungai Buloh,  
 47000, Selangor,  
 Malaysia.

**Telephone :** +603 - 61579698  
**Fax :** +603 - 61578002  
**Email :** Info@alseal.com.my  
**Website :** www.alseal.com.my

## 2. Hazard(s) identification

### GHS Classification

Not hazardous

**GHS Label:** None

**Signal word:** None

**Hazard Statement(s):** None

### Precautionary Statement(s):

**P264** Wash hands thoroughly after handling.  
**P280** Wear protective gloves/protective clothing/eye protection/face protection.  
**P302+P352** IF ON SKIN: Wash with soap and water.  
**P305+P351+P338** IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.  
**P333+P313** If skin irritation or a rash occurs: Get medical advice/attention.  
**P337+P313** If eye irritation persists: Get medical advice/attention.

## 3. Composition/Information on ingredients

| Chemical name              | CAS No. | EINECS | % (w/w) | Toxicology Data                                                                                                              |
|----------------------------|---------|--------|---------|------------------------------------------------------------------------------------------------------------------------------|
| Silyl-terminated polyether | -       | -      | >20     | LD <sub>50</sub> oral (rat): ≥ 20 g/kg<br>LD <sub>50</sub> dermal (rabbit): > 2 g/kg<br>LC <sub>50</sub> inhalation: No data |

## 4. First-aid measures

- **Inhalation:** Remove to fresh air, keep warm and at rest. Contact physician if discomfort persists.
- **Skin contact:** Remove contaminated clothing. Rinse with copious amount of water. Contact physician if discomfort persists.
- **Eye contact:** Contact lenses should be removed. Rinse with copious amount of water immediately, seek medical advice if necessary.
- **Ingestion:** Seek medical advice immediately. DO NOT induce vomiting. Drink plenty of water followed by milk if available. Never give anything by mouth to an unconscious person.

Avoid contact with skin and eyes. In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).



|                                                                                   |                                        |                                                                                    |                                                      |
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|                                                                                   | <b>Material Safety Data Sheet</b>      |                                                                                    | <b>Revision No.:</b> 1                               |
|                                                                                   | <b>AS-4001 MS Construction Sealant</b> |                                                                                    | <b>Revised Date:</b> 01/04/15<br><b>Page:</b> 2 of 4 |

## 5. Fire-fighting measures

- **Suitable extinguishing media:** Use dry chemical powder, foam, carbon dioxide, water fog.
- **Special fire fighting procedures:** Keep up-wind to avoid fumes. Use self-contained breathing apparatus in confined areas.
- **Unusual fire/explosion hazards:** None known.
- **Hazardous combustion products:** Carbon monoxide, carbon dioxide, oxides of nitrogen.
- **Protective measures in fire:** Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

## 6. Accidental release measures

- **Person-related safety precautions:** Wear protective equipment. Keep unprotected persons away. Ensure adequate ventilation.
- **Measure for cleaning/collecting:** Absorb with liquid binding material (sand, diatomite, acid binders, universal binders, sawdust, etc). Dispose of contaminated material as waste according to item 13.
- **Additional information:** Prevent spillage from entering drainage/sewer systems. Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body.

## 7. Handling and storage

- **Handling:** Ensure good ventilation during processing. Do not eat, drink or smoke while handling.
- **Protection against fire/explosion:** General rules of fire prevention should be observed.
- **Storage:** Keep tightly closed and dry. Store in a well-ventilated area, protected from direct sunlight and heat, with temperature below 25°C.

## 8. Exposure controls/personal protection

- **Industrial hygiene:** Remove immediately all contaminated clothing. Do not inhale vapor. Wash hands and contaminated areas with water and soap before leaving the work site. Do not eat, drink or smoke while using the product. Change clothing before leaving workplace.
- **Hand protection:** Suitable protective gloves like nitrile or viton are recommended. The breakthrough time of the selected glove must be greater than the intended use period.
- **Respiratory protection:** An organic respirator NIOSH-approved for organic vapors is recommended where local ventilation is not adequate.
- **Eye protection:** Protective goggles/safety glasses.

## 9. Physical and chemical properties

- **Form** : Paste
- **Color** : Various colors
- **Odor** : Characteristic
- **Boiling temperature** : Not determined
- **Flash point** : 63°C (Closed Cup)
- **Solubility in water** : Insoluble
- **VOC Content** : <10g/L (USEPA Test Method 24)
- **Specific gravity** : Approx. 1.56 g/mL (White & Grey colour), Approx. 1.55 g/mL (Black colour)



|                                                                                   |                                        |                                                                                    |                                                      |
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|                                                                                   | <b>Material Safety Data Sheet</b>      |                                                                                    | <b>Revision No.:</b> 1                               |
|                                                                                   | <b>AS-4001 MS Construction Sealant</b> |                                                                                    | <b>Revised Date:</b> 01/04/15<br><b>Page:</b> 3 of 4 |

## 10. Stability and reactivity

- **Stability:** Stable when stored under recommended conditions.
- **Conditions to avoid:** Open flame, sparks and heat.
- **Hazardous decomposition products:** Carbon monoxide, carbon dioxide, oxides of nitrogen.
- **Hazardous polymerization:** None known if used for intended purposes.
- **Incompatible materials:** Avoid contact with acids, fluorine, and magnesium with hydrogen.

## 11. Toxicology information

No specific oral, inhalation or dermal toxicology data is known for this product.

- **Oral:** Expected to be slightly toxic.
- **Inhalation:** Expected to be slightly toxic.
- **Dermal:** Expected to be sensitizing.

## 12. Ecological information

- **Persistence/Degradability :** Not determined
- **Ecology toxicity :** Not determined

Individual components of this mixture have been independently tested by the raw material suppliers and any known results have been presented above. The results for the individual components may not be representative of the ecological toxicity of this finished product. This finished product has not been tested to determine individual toxicological/ecological limits. Great caution should be taken to prevent release to the environment. See Section 13 for further information.

## 13. Disposal information

Preferred method of disposal includes incineration under controlled conditions in accordance with all local and national laws and regulations. The generation of waste should be avoided or minimized wherever possible. Untreated material is not suitable for disposal. Waste, even in small quantities, should never be poured down into drains, sewers or watercourses. Waste must be disposed of in accordance with federal, state and local environmental control regulations. This material, when properly mixed and cured at the proper mix ratio, may be safely landfilled.

## 14. Transport information

**Road transport (ADR)**  
Not regulated

**Marine transport (IMDG)**  
Not regulated

**Air transport (IATA)**  
Not regulated



|                                                                                   |                                        |                                                                                    |                                                      |
|-----------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------|
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|                                                                                   | <b>Material Safety Data Sheet</b>      |                                                                                    | <b>Revision No.:</b> 1                               |
|                                                                                   | <b>AS-4001 MS Construction Sealant</b> |                                                                                    | <b>Revised Date:</b> 01/04/15<br><b>Page:</b> 4 of 4 |

## 15. Regulatory information

**EU Classification:** Not hazardous.

**EU Risk(R) Phrases:** None

**EU Safety(S) Phrases:**

- S25** Avoid contact with eyes.  
**S26** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
**S28** After contact with skin, wash immediately with plenty of soap with water.  
**S36/37/39** Wear suitable protective clothing, gloves and eye/face protection.

## 16. Other information

**Definitions:**

- **EINECS** : European Inventory of Existing Commercial Chemical Substances.
- **TLV** : Threshold Limit Value.
- **LD<sub>50</sub>** : The minimum dose required for lethal effects in 50% of agiven population of testspecimens.
- **NIOSH** : National Institute for Occupational Safety and Health.

All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee these are the only hazards that exist. The details contained herein are based on our present state of knowledge and experience in characterizing our product with regard to any possible safety requirement. We do, however, pass them on without any warranty or property assurances.



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



PSB Singapore

**Note:** This report is issued subject to the Testing and Certification Regulations of the TÜV SÜD Group and the General Terms and Conditions of Business of TÜV SÜD PSB Pte Ltd. In addition, this report is governed by the terms set out within this report.

Choose certainty.  
Add value.

**SUBJECT:**

Testing of sealant

**TESTED FOR:**

Aalseal Marketing Sdn Bhd  
Lot 2291, Jalan Kampung Baru  
Kg. Baru Sungai Buloh  
47000, Selangor  
Malaysia

Attn : Mr Cheong Chee Han

**SAMPLE DESCRIPTION:**

The following items were received as shown:

| Sample                                    | Size             | Quantity      | Date received |
|-------------------------------------------|------------------|---------------|---------------|
| 'Aalseal AS-4001 MS Construction Sealant' | 290 ml/cartridge | 10 cartridges | 19 Jun 2014   |
| Primer : '602 Concrete Primer'            | 100 g            | 2 cartridges  | 10 Sep 2014   |
|                                           |                  | 1 tin         | 19 Jun 2014   |

**TEST METHODS:**

Adopted ASTM C920 : 2008 Standard Specification For Elastomeric Joint Sealants

Staining And Colour Change

1. ASTM C510 : 2005 Standard Test Method For Staining And Colour Change Of Single Or Multi-Component Joint Sealants

Test cycle : 8 hours UV exposure at 55°C and 4 hours condensation at 45°C  
Exposure duration : 100 hours  
No. of determination : 1 for staining test, 1 for colour change test, 1 as control



Laboratory:  
TÜV SÜD PSB Pte. Ltd.  
Testing Services  
No.1 Science Park Drive  
Singapore 118221

Phone : +65-6885 1333  
Fax : +65-6776 8670  
E-mail: testing@tuv-sud-psb.sg  
www.tuv-sud-psb.sg  
Co. Reg : 199002667R

Regional Head Office:  
TÜV SÜD Asia Pacific Pte. Ltd.  
3 Science Park Drive, #04-01/05  
The Franklin, Singapore 118223  
TUV®



**Test Report No. 7191108038-MEC15/02-ED (221406823)**  
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PSB Singapore

Extrudability

2. ASTM C1183 : 2008 Standard Test Method For Extrusion Rate Of Elastomeric Sealants  
(Cross Reference: ASTM D1475 : 2008 Standard Test Method For Density Of Liquid Coatings, Inks And Related Products)

Apparatus : Pycnometer and caulking gun  
Test pressure : 40 psi  
No. of determination : 1

Flow Properties

3. ASTM C639 : 2007 Standard Test Method For Rheological (Flow) Properties Of Elastomeric Sealants

Method : Test method for 'Type II' sealant  
Test conditions : a) 4.4°C in environmental chamber for 4 hours  
b) 50°C in oven for 4 hours  
No. of determinations : 2 for vertical and horizontal displacements

Hardness

4. ASTM C661 : 2006 Standard Test Method For Indentation Hardness Of Elastomeric-Type Sealants By Means Of A Durometer

Test Conditions:

a) 23°C and 50% relative humidity for 7 days  
b) 38°C and 95% relative humidity for 7 days  
c) 23°C and 50% relative humidity for 7 days  
No. of determinations : 2, 3 points per test piece

Tack-Free Time

5. ASTM C679 : 2003 Standard Test Method For Tack-Free Time Of Elastomeric Sealants

No. of determinations : 2

Cyclic Adhesion & Cohesion

6. ASTM C719 : 2005 Standard Test Method For Adhesion And Cohesion Of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)

Test Conditions:

a) 23°C and 50% relative humidity for 7 days  
b) 38°C and 95% relative humidity for 7 days  
c) 23°C and 50% relative humidity for 7 days  
d) Immersion in distilled water at 23°C for 7 days  
e) Drying in oven at 70°C for 7 days





Cyclic Test Conditions:

Stage A-10 cycles of joint movements:

- a) The joint width was compressed from 12.7mm to 9.5mm at 3.2 mm/h
- b) It was extended from 9.5mm to 15.9mm at 3.2 mm/h
- c) It was compressed again from 15.9mm to 12.7mm at 3.2 mm/h

Stage B-10 cycles of joint movements:

- a) The joint width was compressed to 9.5mm 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 15.9mm at -26°C and 3.2 mm/h
- d) The specimens were removed and allowed to condition to room temperature

No. of determinations : 3

Effects Of Heat Ageing

7. ASTM C1246 : 2006 Standard Test Method For Effects Of Heat Ageing On Weight Loss, Cracking, And Chalking Of Elastomeric Sealants After Cure

Test Conditions:

- a) 23°C and 50% relative humidity for 28 days
- b) 70°C for 21 days

No. of determinations : 3, 1 as control

Effects Of Accelerated Weathering

8. Adopted ASTM C793 : 2005 Standard Test Method For Effects Of Accelerated Weathering On Elastomeric Joint Sealants

Test cycle : 8 hours UV exposure at 55°C and 4 hours condensation at 45°C  
Lamp designation : Fluorescent UVA 340 mm  
Exposure duration : 250 hours  
No. of determinations : 3 (1 as control)  
Bend test  
Apparatus : Steel mandrel  
Test condition : -26°C for 24 hours  
No. of determinations : 3

Adhesion-In-Peel

9. ASTM C794 : 2006 Standard Test Method For Adhesion-In-Peel Of Elastomeric Joint Sealants

Test Conditions:

- a) 23°C and 50% relative humidity for 7 days
- b) 38°C and 95% relative humidity for 7 days
- c) 23°C and 50% relative humidity for 7 days
- d) Immersion in water at 23°C for 7 days

Substrate : Mortar  
Crosshead speed : 50.8 mm/min  
No. of determinations : 4



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



PSB Singapore

Material Identification/Verification

10. Material Identification/Verification By Fourier Transform Infra-Red Spectrometric Analysis (FTIR)

CONDITIONING:

Unless otherwise specified, all test specimens were tested at  $23 \pm 2^\circ\text{C}$  and  $65 \pm 5\%$  relative humidity.

TEST RESULTS:

| Test                                                                           | 'Aiseal AS-4001<br>MS Construction Sealant'                                                                                         | ASTM C920 : 2008 Standard Specification<br>For Elastomeric Joint Sealants                                                                                                                                                      |
|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Staining And Colour Change                                                  | No staining and no colour change                                                                                                    | The sealant shall not cause any visible staining on the top surface of a white cement mortar base                                                                                                                              |
| 2. Extrudability                                                               | >10 ml/min                                                                                                                          | Type S (single component), grade NS (non-sag or gunnable sealant) shall have an extrusion rate time of not < 10 ml/min                                                                                                         |
| 3. Rheological (Flow) Properties                                               | Vertical displacement: 0 mm sag<br>Horizontal displacement: No deformation                                                          | Grade NS (non-sag) or gunnable sealant shall have flow characteristics such that it does not sag >4.8mm in vertical displacement and shall show no deformation in horizontal displacement (refers to Types II and IV sealants) |
| 4. Indentation Hardness<br>test piece 1, average<br>test piece 2, average      | 31<br>32                                                                                                                            | T (traffic) sealant shall have a hardness reading of not <25 or >50 after being properly cured<br>NT (non-traffic) sealant shall have a hardness reading of not <15 or >50 after being properly cured                          |
| 5. Tack-Free Time                                                              | No transfer of test specimens to the polyethylene film                                                                              | There shall be no transfer of the sealant to the polyethylene film when tested at 72 hours                                                                                                                                     |
| 6. Adhesion & Cohesion Under<br>Cyclic Movement, Class 25                      | No bond failure                                                                                                                     | The total loss in bond and cohesion areas among the three specimens tested for each surface shall not be >9 cm <sup>2</sup> with mortar substrates                                                                             |
| 7. Effects Of Heat Ageing On<br>Weight Loss, Cracking And<br>Chalking, average | 0.8%<br>No cracking and chalking                                                                                                    | The sealant shall not lose >7% of its original weight or show any cracking and chalking                                                                                                                                        |
| 8. Effects Of Accelerated<br>Weathering                                        | No cracks after UV exposure<br>and bend test                                                                                        | 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                                                                                 |
| 9. Adhesion-In-Peel, average                                                   | 33.0 N (7.4 lbf)<br>cohesive failure within the sealant and no adhesive bond loss between sealant and substrate for each test piece | The peel strength for each individual test shall not be <22.2 N (5 lbf) and the sealant shall show no >25% adhesive bond loss for each individual test                                                                         |
| 10. Material Identification/<br>Verification By FTIR                           | MS Polymer-based material<br>(refer to Figure 1)                                                                                    | -                                                                                                                                                                                                                              |

*Ed* *E*

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



PSB Singapore

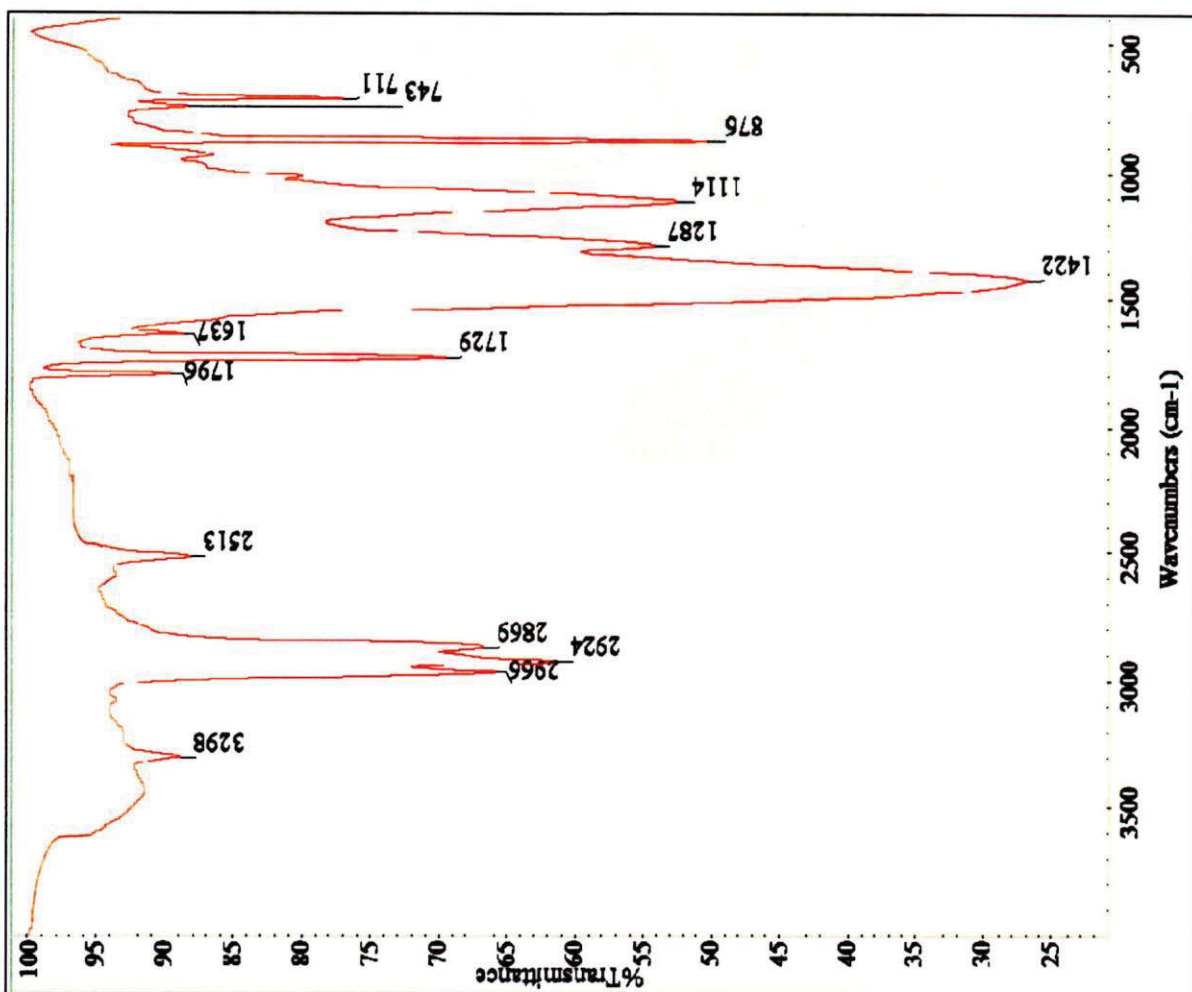
REMARKS:

1. The test conditions for staining and colour change tests and effects of accelerated weathering test were adopted from ASTM G154 : 2006 Standard Practice For Operating Fluorescent Light Apparatus For UV Exposure Of Non-Metallic Materials.
2. The class 25 joint movement for adhesion/cohesion cyclic test was specified by the client.
3. a. As specified by the client, the primer was applied onto mortar substrates and allowed to dry till tack-free.  
b. The primed mortar substrates were used for sample preparations of stain and colour change, adhesion/cohesion cyclic and adhesion-in-peel tests.

Eddie Suwand  
Senior Associate Engineer

Eng Aik How  
Product Manager  
Building  
Mechanical Centre

Photo 1 : IR spectrum of 'Aiseal AS-4001 MS Construction Sealant'





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



PSB Singapore

Please note that this Report is issued under the following terms :

1. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way "guarantees" the later performance of the product/equipment. Unless otherwise stated in this report, no tests were conducted to determine long term effects of using the specific product/equipment.
2. The sample/s mentioned in this report is/are submitted/supplied/manufactured by the Client. TÜV SÜD PSB therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.
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5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

July 2011



**ALSEAL MARKETING SDN. BHD.** (625140-D)  
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08<sup>th</sup> Jun 2015

Dear Customers,

**RE: "Aseal" AS-4001 MS Construction Sealant Meets SCAQMD Rule #1168**

We are pleased to inform that "Aseal" AS-4001 MS Construction Sealant has been tested with USEPA Test method 24 and SCAQMD Method 303-91 and using equations set out in L.N. 107 of 2009 Air Pollution Control (VOC)(Amendment) Regulation 2009.

We hereby confirm that the AS-4001 has <10g/L of VOC contents, thereby meeting the SCAQMD (South Coast Air Quality Management District) Rule #1168, which states 250g/L as the VOC limit for "Architectural Sealant". The test report is attached overleaf.

This is also to inform that SCAQMD is referenced by LEED green building rating system and other sustainable building ranking schemes in the world.

Please contact us should you need further information.

Thank you.

Regards,

-----  
**Cheong Chee Leong**  
**General Manager**  
**Alseal Marketing Sdn Bhd**



**CERTIFICATE OF ANALYSIS**

ALSEAL MARKETING SDN. BHD.  
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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

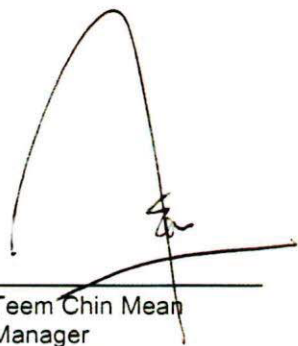
Sample Description : AS-4001 MS Construction Sealant  
Analysis results :

| Parameter | Unit | Analysis Result | Standard Method/Technique/Equipment Used                                                                                                              |
|-----------|------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| VOC Test  | g/L  | ND(<10)         | USEPA Test method 24 and SCAQMD Method 303-91 and using equations set out in L.N. 107 of 2009 Air Pollution Control (VOC) (Amendment) Regulation 2009 |

ND denotes not detected

(< Numeric number) denotes detection limits

Remark : -



Teem Chin Mean  
Manager  
M.Sc., AMIC.  
A/2152/4620/04

**Title:** Weather testing on MS Construction Sealant AS-4001

**Test Period:**

From 13 July 2012 to 23 October 2013

**Sample Description:**

| Sample | Description                     | Colour | Shore A hardness |
|--------|---------------------------------|--------|------------------|
| 1.     | AS-4001 MS Construction Sealant | White  | 33               |

**Test Method:**

ASTM C 1442 – 06 Conducting tests on Sealants Using Artificial Weathering Apparatus

- **Apparatus:** QUV chamber with fluorescent UVA-340 lamps. Irradiance set to 0.89 W/(m<sup>2</sup>.nm) at 340 nm.
- **Specimens thickness:** 20 mm
- **Test Cycle:** 8 hours UV exposure at 60°C & 4 hours condensation at 50°C.
- **Exposure duration:** 10,000 hours

**Test Results:**

| Sample | 0 Hour     |                  | After 7000 Hours                             |                  | After 10000 Hours                      |                  |
|--------|------------|------------------|----------------------------------------------|------------------|----------------------------------------|------------------|
|        | Appearance | Shore A Hardness | Appearance                                   | Shore A Hardness | Appearance                             | Shore A Hardness |
| 1      | -          | 33               | No crack, Surface dirty & look a bit greyish | 33               | No crack, Surface dirty & look greyish | 33               |

**Remark:** Kindly refer next page picture for the appearance after 10,000 hours







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## COMPARISON TABLE

### ALSEAL MS (Modified Silicone) Sealants VS PU (Polyurethane) Sealants

| Characteristics                                                                                                            | ALSEAL MS Sealants                                       | PU Sealants                                                    |
|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------|
| Chemical Base                                                                                                              | Modified Silicone Polymer<br><i>(a.k.a. STPE/Hybrid)</i> | Polyurethane                                                   |
| ASTM C920 Compliant                                                                                                        | Yes                                                      | Yes                                                            |
| Tack Free Time                                                                                                             | <1 hour                                                  | >1 hour                                                        |
| Elongation At Break (ASTM D412)                                                                                            | >900%                                                    | 500% - 900%                                                    |
| Movement Capability (ASTM C719)                                                                                            | ±50%                                                     | ±25%                                                           |
| VOC Content                                                                                                                | Low<br><i>(&lt;10g/L, comply to SCAQMD rule 1168)</i>    | High                                                           |
| Contain Solvent & Isocyanate <i>(Hazardous)</i>                                                                            | No                                                       | Yes                                                            |
| Bubbling<br><i>(caused by isocyanate that reacts with moisture and generates CO<sup>2</sup> bubbles in curing process)</i> | No                                                       | Yes<br><i>(the higher the moisture level the more bubbles)</i> |
| Shrinkage (Recessed) After Cure<br><i>(caused by solvent that evaporates in curing process)</i>                            | No                                                       | Yes                                                            |
| Paintable                                                                                                                  | Yes                                                      | Yes                                                            |
| Damp Substrate Bonding                                                                                                     | Yes                                                      | No                                                             |
| UV Resistance                                                                                                              | Good                                                     | Bad                                                            |
| Service Life                                                                                                               | >10 years                                                | 3-10 years                                                     |
| Primerless Bonding To Most Substrates                                                                                      | Yes                                                      | No                                                             |
| Storage Stability/Heat Resistance                                                                                          | Good ✓                                                   | Bad                                                            |
| Service Temperature                                                                                                        | -30°C to +100°C                                          | -40°C to +70°C                                                 |
| Price                                                                                                                      | Moderate<br><i>(competitive against PU sealants)</i>     | Moderate                                                       |