Silicone solutions for RTV Formulator
Contents

• Vinyl Fluids & Vinyl Dimethicones
• Crosslinker & Modifier
• Vinyl Gum & Base Compound
• Vinyl Resins
• Additives - Inhibitor & Pt Catalyst
• Condensation Cure RTV
• Intermediates for silicone synthesis
BRB’s Value Proposition

• BRB is an independent silicone supplier and part of Petronas group of companies.
• Quality Silicone intermediates at competitive pricing
• Quick customization to help customer shorten commercialization time.
• Global reach & supply chain
• High integrity, protection of customer’s Intellectual Property
• Flexible MOQ to support customers’ initial launch
BRB Vinyl Fluids

- **BRB Vinyl Fluids** are Vinyl end-capped linear polydimethylsiloxanes with different viscosities.

- **Features & Benefits**
  - Used as the base polymer in most addition-cured RTV-2 formulations
  - Suitable for formulation of technical products
  - Volatile content <2 wt%
  - Customization upon request of vinyl groups in different constellation

![Chemical Structure](image)

<table>
<thead>
<tr>
<th>Product name</th>
<th>Viscosity (cSt)</th>
<th>Vinyl content (mmol/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRB Vinyl Fluid 20 cSt</td>
<td>20</td>
<td>1.0</td>
</tr>
<tr>
<td>BRB Vinyl Fluid 50 cSt</td>
<td>50</td>
<td>0.80</td>
</tr>
<tr>
<td>BRB Vinyl Fluid 100 cSt</td>
<td>100</td>
<td>0.38</td>
</tr>
<tr>
<td>BRB Vinyl Fluid 200 cSt</td>
<td>200</td>
<td>0.25</td>
</tr>
<tr>
<td>BRB Vinyl Fluid 500 cSt</td>
<td>500</td>
<td>0.15</td>
</tr>
<tr>
<td>BRB Vinyl Fluid 1000 cSt</td>
<td>1000</td>
<td>0.11</td>
</tr>
<tr>
<td>BRB Vinyl Fluid 2000 cSt</td>
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<td>BRB Vinyl Fluid 5000 cSt</td>
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<td>BRB Vinyl Fluid 10000 cSt</td>
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<td>BRB Vinyl Fluid 20000 cSt</td>
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<td>BRB Vinyl Fluid 65000 cSt</td>
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<td>0.03</td>
</tr>
<tr>
<td>BRB Vinyl Fluid 165000 cSt</td>
<td>165000</td>
<td>0.02</td>
</tr>
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</table>
BRB Vinyl Dimethicone

- **BRB Vinyl Dimethicones** are Vinyl end-capped linear polydimethylsiloxanes with different viscosities.
- **Used** as base polymers for formulating dental impressions, electronic & auto pottants/encapsulants and medical device applications.
- **Features & Benefits**
  - Clear liquid & wide range of viscosities
  - Very low volatile content of <0.5 wt%
  - Low cyclic (D4/5/6) content @ 0.1% available upon request.
  - Customization upon request of vinyl groups in different constellation

\[
\begin{align*}
\text{CH}_3 & \rightarrow \text{CH} = \text{Si} - \text{O} - \text{Si} - \text{O} - \text{Si} - \text{CH} = \text{CH}_2 \\
& \quad \quad \quad \quad \quad \text{CH}_3
\end{align*}
\]

(vinyl terminated)

<table>
<thead>
<tr>
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<th>Viscosity (cSt)</th>
<th>Vinyl content (mmol/g)</th>
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<td>20</td>
<td>1.0</td>
</tr>
<tr>
<td>BRB Vinyl Dimethicone 50 cSt</td>
<td>50</td>
<td>0.80</td>
</tr>
<tr>
<td>BRB Vinyl Dimethicone 100 cSt</td>
<td>100</td>
<td>0.38</td>
</tr>
<tr>
<td>BRB Vinyl Dimethicone 200 cSt</td>
<td>200</td>
<td>0.25</td>
</tr>
<tr>
<td>BRB Vinyl Dimethicone 500 cSt</td>
<td>500</td>
<td>0.15</td>
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<tr>
<td>BRB Vinyl Dimethicone 1000 cSt</td>
<td>1000</td>
<td>0.11</td>
</tr>
<tr>
<td>BRB Vinyl Dimethicone 2000 cSt</td>
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<td>0.08</td>
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<tr>
<td>BRB Vinyl Dimethicone 5000 cSt</td>
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<td>0.05</td>
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<td>BRB Vinyl Dimethicone 20.000 cSt</td>
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<td>0.04</td>
</tr>
<tr>
<td>BRB Vinyl Dimethicone 65.000 cSt</td>
<td>65000</td>
<td>0.03</td>
</tr>
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</table>
BRB Mono Vinyl Fluid

• BRB Mono Vinyl Fluid is a single side Vinyl end-capped linear polydimethylsiloxanes

• Features & Benefits
  • Single side vinyl terminated to achieve reduction in modulus & hardness
  • Low volatile @ 1% (wt)
  • Viscosity of 1000cSt
**BRB Crosslinkers**

- **BRB SiH Crosslinkers** are SiH-functional polydimethylsiloxanes with varying SiH content and viscosities
- Used as the crosslinker in addition-cured RTV-2 formulation
- **Features & Benefits**
  - Major influence on the mechanical properties of the elastomer
  - Cures with vinyl-functional components without by-product formation
  - Low volatile & cyclic (D4/5/6) content available upon request
  - Both pendant and terminal SiH available for higher reactivity. Pot life impact.
  - Customisation of molecular structure available upon request

<table>
<thead>
<tr>
<th>Product name</th>
<th>Type of SiH</th>
<th>Viscosity (cSt)</th>
<th>SiH content (mmol/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRB Crosslinker 434H4</td>
<td>Pendant</td>
<td>50</td>
<td>4</td>
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<tr>
<td>BRB Crosslinker 1595H7</td>
<td>Pendant</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>BRB Crosslinker 1738H1.9</td>
<td>Pendant</td>
<td>53</td>
<td>1.9</td>
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<tr>
<td>BRB Crosslinker 1739H0.5</td>
<td>Pendant</td>
<td>1000</td>
<td>0.55</td>
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<tr>
<td>BRB Crosslinker 959H2.5 (low cyclic)</td>
<td>Pendant &amp; Endcapped</td>
<td>30</td>
<td>2.5</td>
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</tbody>
</table>

Crosslinker (pendant SiH)

Crosslinker extender - 959H2.5 (Pendant & terminated SiH)
BRB Modifiers (Chain Extender)

- **BRB Modifiers** are SiH terminated polydimethylsiloxanes with varying SiH content and viscosities.
- Used for the formulation of addition-cured RTV-2
- **Features & Benefits**
  - Synergetic effect with BRB Crosslinkers on mechanical properties of elastomer
  - Allows free flowing low viscosity formulations with good mechanical properties
  - Cures with vinyl-functional components without by-product formation
  - Reduces crosslinking density thereby reduce elastomer hardness
  - Suitable to formulate addition cure gel
  - Low dosage required
  - Low volatile content available upon request

<table>
<thead>
<tr>
<th>Product name</th>
<th>Type of SiH</th>
<th>Viscosity (cSt)</th>
<th>SiH content (mmol/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRB Modifier 1439</td>
<td>End-capped</td>
<td>5</td>
<td>2.5</td>
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<tr>
<td>BRB Modifier 1449</td>
<td>End-capped</td>
<td>13</td>
<td>1.3</td>
</tr>
<tr>
<td>BRB Modifier 1459</td>
<td>End-capped</td>
<td>13</td>
<td>1.5</td>
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</table>
BRB Vinyl Gum

• **BRB GUM TG 22** is a Vinyl-functional Polydimethylsiloxane Gum
• Used as key ingredient to manufacture various silicone rubber as well as to manufacture master-batches of pigments & process additives
• **Features & Benefits**
  – Low Volatile Content
  – Translucent
  – High level of filler/pigment acceptance
  – High storage stability
  – Food grade approval and conforms to the following guidelines:
    • EU 10/2011
    • USA FDA 21 CFR
    • China GB9685-2016 & GB4806-11-2016
    • MERCOSUR/GMC/RES.N°02/12

<table>
<thead>
<tr>
<th>Product name</th>
<th>Molecular weight (10⁴)</th>
<th>Volatile (wt%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRB Vinyl Gum TG 22</td>
<td>67</td>
<td>&lt;3</td>
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</tbody>
</table>
BRB Vinyl-functional base compound

- BRB B300 & 1300 are a mixture of vinyl-group-containing silicones and reinforcing filler
- Used for formulating addition-cured two-component silicone rubber
- Features & Benefits
  - Impart mechanical properties (tensile, elongation) of addition-cured silicone rubber
  - Eliminate handling of dry, dust forming filler during formulation process
  - Offered with a complete package of components for formulating addition-cured RTV-2.
  - Translucent colorless paste

<table>
<thead>
<tr>
<th>Product name</th>
<th>Viscosity (cSt)</th>
<th>Vinyl (mmol/g)</th>
<th>Hardness (Shore A)</th>
<th>Tear Strength (kN/m)</th>
<th>Tensile Strength (Mpa)</th>
<th>Elongation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 300</td>
<td>300,000</td>
<td>0.09</td>
<td>47 to 53</td>
<td>26 to 40</td>
<td>7.5 to 25</td>
<td>440 to 600</td>
</tr>
<tr>
<td>B 1300</td>
<td>1,300,000</td>
<td>0.11</td>
<td>57 to 63</td>
<td>25 to 40</td>
<td>8 to 25</td>
<td>300 to 500</td>
</tr>
</tbody>
</table>

- 100 parts of Base, 3.5 parts of crosslinker 434H4, 0.12 parts of 1-ETCH & 0.05 parts of Pt catalyst
- Curing - 10 mins @ 175°C and post cure 4 hours @ 200°C
BRB Vinylated MQ Resin

• Vinyl-functional resin dissolved in Vinyl fluid or 100% solids.
• As an additive for RTV-2 addition-cured formulations. Especially suitable to formulate clear elastomer in replacement of reinforcing filler

• Features & Benefits
  – Increases hardness of elastomer when formulated into RTV-2
  – Improves mechanical properties of elastomer when formulated into RTV-2
  – Good compatibility with other addition-cured RTV-2 components
  – Customization of resin and viscosity is available upon request
  – Clear liquid

<table>
<thead>
<tr>
<th>Product name</th>
<th>Viscosity (cSt)</th>
<th>Vinyl content (mmol/g)</th>
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</thead>
<tbody>
<tr>
<td>BRB MQ 339</td>
<td>6500</td>
<td>0.22</td>
</tr>
<tr>
<td>BRB MQ 393</td>
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<td>0.2</td>
</tr>
<tr>
<td>BRB MQ 325</td>
<td>6500</td>
<td>0.26</td>
</tr>
<tr>
<td>BRB MQ 330</td>
<td>6500</td>
<td>0.3</td>
</tr>
<tr>
<td>BRB MQ 100</td>
<td>Powder</td>
<td>0.96</td>
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</table>
Vinyl Additives - Inhibitors

- **BRB Inhibitors** are Vinyl-functional siloxanes used to increase the pot life of addition-cured RTV-2

- **Features & Benefits**
  - Increases pot life from minutes up to hours. For longer pot life (days), Ethynylcyclohexanol (ECH) is recommended.
  - Vinyl M2 (divinyl tetramethyl disiloxane) is highly volatile, which enables instant curing at elevated temperature
  - Vinyl D4 (tetravinyl tetramethyl cyclotetrasiloxane) is less volatile, which enables inhibited curing at elevated temperature
  - Low dosage required
  - Good compatibility with addition-cured RTV-2 components

<table>
<thead>
<tr>
<th>Product name</th>
<th>Viscosity (cSt)</th>
<th>Density (g/cm³)</th>
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<tbody>
<tr>
<td>BRB Vinyl M2 (CAS# - 2627-95-4)</td>
<td>1</td>
<td>0.81</td>
</tr>
<tr>
<td>BRB Vinyl D4 (CAS# - 2554-06-5)</td>
<td>4</td>
<td>0.98</td>
</tr>
</tbody>
</table>
BRB Platinum (Pt) Catalyst

- **BRB Pt Cat** consists of Karstedt platinum catalyst in vinyl fluid
- Used for the formulation of addition-cured RTV-2.

**Features & Benefits**
- Available as 1 and 2 wt% Pt concentrations
- Enables room temperature curing as well as accelerated curing at elevated temperature
- Extremely low dosage required
- Good compatibility with addition-cured RTV-2 components
- Slightly yellow clear liquid

<table>
<thead>
<tr>
<th>Product name</th>
<th>Pt content (wt%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRB Pt Cat 10000 Fast</td>
<td>1.0</td>
</tr>
<tr>
<td>BRB Pt Cat 20000 Fast</td>
<td>2.0</td>
</tr>
</tbody>
</table>
Condensation cure RTV-2

- Silanol endcapped polydimethylsiloxane base polymer
  - Low viscosity (cSt) - 40 & 70 cSt
  - Mid viscosity (cSt) - 750, 1000, 2000, 3500, 5000 & 6000 cSt
  - High Viscosity (cSt) - 20,000, 50,000, 80,000, 300,000 cSt

- Crosslinker for RTV-1 & 2
  - Acetoxy - BRB Silanil MTAS, ETAS, PTAS
  - Oxime - BRB Silanil MOS, VOS
  - Alkoxy - BRB Silanil 118 (MTMS), 203 (MTES)
  - RTV-2 - BRB Silanil Si-28, Si-40 (TEOS)

- Catalyst
  - BRB DBTDL - Dibutyltin dilaurate CAS# 77-58-7
  - BRB DBTDA - Dibutyltin diacetate CAS# 1067-33-0
Intermediates for Silicone Synthesis

- **BRB 1,1,3,3 Tetramethyldisiloxane**
  - Primarily used as an intermediate in the preparation of silicon hydride end-capped siloxane polymers and other organo silicone
  - CAS number - 3277-26-7

- **BRB D4H (2,4,6,8 Tetramethylcyclotetrasiloxane)**
  - Utilized widely to synthesize variety functional reactive silicone fluids and crosslinker for addition cure rubber
  - CAS number - 2370-88-9

- **BRB Phenyl D4 (Octaphenylcyclotetrasiloxane)**
  - Also used widely to synthesize variety phenyl functional silicone fluids and phenyl crosslinker for vinyl addition silicone rubber
  - CAS number - 546-56-5

- **BRB Silicone Oil 0.65 cSt (Hexamethyldisiloxane)**
  - Various application one of which is an end blocker in the production of silicone polymer
  - CAS number – 107-46-0
Powerful like a major, flexible like a formulator