



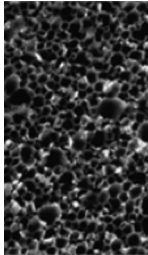
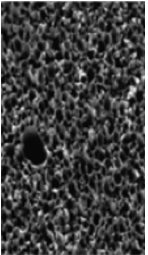
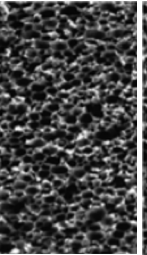
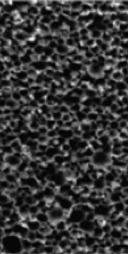
# VORASURF™ Polyurethane Additives

## in polyisocyanurate foam – construction applications

Dow offers silicone surfactant additives to manufacture various types of polyisocyanurate (PIR) and polyurethane (PUR) insulation panels (flex-faced, metal-faced, continuous and discontinuous panels). VORASURF™ additives offer increased insulation values, improved adhesion, better surface quality, a wider processing latitude and reduced smoke and flame generation.



**Table 1:** Pore!Scan foam cell size

| Silicone | VORASURF™<br>DC 193<br>Additive   | VORASURF™<br>DC 5357<br>Additive  | VORASURF™<br>DC 5585<br>Additive  | Competitor<br>REF A   |
|----------|---|---|---|---|
|          |  |  |  |  |
| μm       | 187   | 150   | 171   | 166   |

**Table 2:** HP machine nP blown foam performances

| Properties                        | VORASURF™<br>Silicone Polyurethane Additives |         |         | Competitor<br>REF A |
|-----------------------------------|--|---------|---------|---------------------|
|                                   | DC 193                                       | DC 5357 | DC 5585 |                     |
| Reactivity                        | =  | =       | =       | REF                 |
| Insulation                        | –  | +       | =       | REF                 |
| Mechanical                        | +  | +       | =/+     | REF                 |
| Aesthetics panels<br>5 cm thick   | =  | +/-     | --      | REF                 |
| Adhesion                          | =/+  | +       | +       | REF                 |
| Demolding                         | =  | =       | +       | REF                 |
| Liquid flow panels<br>10 cm thick | +  | +       | +       | REF                 |

+ Better than REF – Less than REF = Comparable to REF

### Project goal:

Identify Dow VORASURF™ Silicone Polyurethane Additives in a normal pentane (nP) blown PIR foam system based on PEPS polyols.

### Results:

- VORASURF™ DC 5357 Additive provided better insulation performance vs. reference
- VORASURF™ DC 5585 Additive performed similarly to the reference

**Table 3:** Formulations tested in the HP machine

| Formulation   |  |
|---------------|--|
| Polyol        | Polyesters                                     |
| Catalyst      | Catalysts                                      |
| Additive      | Flame retardant                                |
| Blowing agent | Water  |
| Blowing agent | nP (70%)                                       |
| Surfactant    | VORASURF™ XXXX Silicone Polyurethane Additives |
| Isocyanate    | pMDI high functionality – index 2.5            |



**Table 4:** HP machine cP and iP blown foam performances

| Properties       | VORASURF™ Silicone Polyurethane Additives |         |         |         |        |
|------------------|---|---------|---------|---------|--------|
|                  | DC 5357                                   | DC 5604 | DC 5585 | RF 5374 | DC 193 |
| Reactivity       | =   | =       | =       | =       | REF    |
| Insulation       | ++  | =       | +/=     | +       | REF    |
| Mechanical       | =   | =/-     | =       | +       | REF    |
| Aesthetics       | -   | ++      | +/=     | -/=     | REF    |
| Adhesion         | =   | =       | =       | =       | REF    |
| Demolding        | ++  | +       | =       | +       | REF    |
| Fire performance | =   | =       | =       | =       | REF    |

+ Better than REF - Less than REF = Comparable to REF

**Table 5:** Formulations tested in the HP machine

| Formulation   |  |
|---------------|--|
| Polyol        | Polyesters                                     |
| Catalyst      | Catalysts                                      |
| Additive      | Flame retardant                                |
| Blowing agent | Water  |
| Blowing agent | cP (70%)                                       |
| Blowing agent | iP (30%)                                       |
| Surfactant    | VORASURF™ XXXX Silicone Polyurethane Additives |
| Isocyanate    | pMDI high functionality – index 2.5            |

These are typical properties, not to be construed as specifications.

**Project goal:**

Identify Dow VORASURF™ Silicone Polyurethane Additives in a cyclopentane (cP) / isopentane (iP) blown PIR foam system based on PEPS polyols.

**Results:**

- VORASURF™ DC 5357 Additive provided better insulation performance (measured at 10°C): 5% k-factor improvement vs. reference
- VORASURF™ DC 5604 Additive produced foam with outstanding aesthetics
- VORASURF™ DC 5585 Additive performed similarly to the reference but with marginally improved foam insulation and aesthetic properties
- VORASURF™ RF 5374 Additive performed similarly to the reference providing improved insulation and demolding

For more information on VORASURF™ Silicone Polyurethane Additives, contact your Dow representative or visit [www.dow.com/vorasurf](http://www.dow.com/vorasurf)

Image: dow\_40370460165

Notice: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries. Dow assumes no obligation or liability for the information in this document. References to "Dow" or the "Company" mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.®™ Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

© 2020 The Dow Chemical Company. All rights reserved.

2000000880

Form No. 26-2576-01-0320 S2D