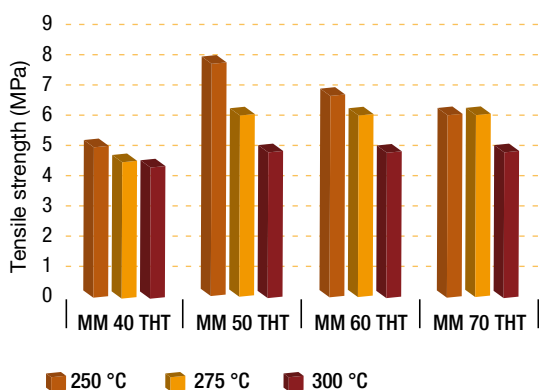


# Heat resistance

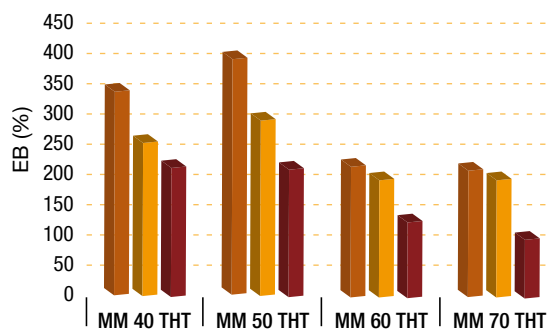
In order to produce products answering strict criteria in terms of heat resistance, Bluestar Silicones developed a very high temperature resistance (THT) range, which can resist until 300 °C without significant deterioration of its properties.

Bluestar Silicones also offers a complete range of additives allowing the improvement of the heat stability of all master batches.

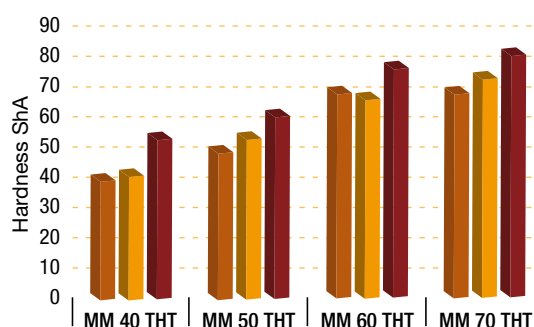
## TENSILE STRENGTH EVOLUTION AFTER 7 DAYS



## ELONGATION AT BREAK EVOLUTION AFTER 7 DAYS



## SHORE A HARDNESS EVOLUTION AFTER 7 DAYS



# Oil resistance

Generally, the aggressiveness of the engine oils towards rubber increases with temperature, and especially with temperatures higher than 100-120 °C. Beyond 150 °C, only silicones can ensure a sufficient sealing for automobile gasketing.

In order to manufacture products answering strict criteria in terms of oil resistance, Bluestar Silicones proposes:

- ♦ 600 Serie especially designed for automotive applications.

|                                | No post cure   |        |           |        |           |        |           |        |
|--------------------------------|--|--------|-----------|--------|-----------|--------|-----------|--------|
|                                | MF 620 U   |        | MF 660 U* |        | MF 670 U* |        | MF 680 U* |        |
| <b>Shore A hardness</b>        | 17   |        | 60        |        | 70        |        | 80        |        |
| <b>Tensile strength (MPa)</b>  | 5.1  |        | 7         |        | 7.6       |        | 5.9       |        |
| <b>Elongation at break (%)</b> | 1,050  |        | 390       |        | 405       |        | 290       |        |
|                                | Properties after immersion for 70 h at 150 °C in ASTM 1 oil  |        |           |        |           |        |           |        |
|                                | MF 620 U   |        | MF 660 U* |        | MF 670 U* |        | MF 680 U* |        |
| <b>Shore A hardness</b>        | 14   | (-3)   | 58        | (-2)   | 68        | (-2)   | 80        | 0      |
| <b>Tensile strength (MPa)</b>  | 4.2  | (-17%) | 6.2       | (-11%) | 6.8       | (-11%) | 4.8       | (-18%) |
| <b>Elongation at break (%)</b> | 1,045  | (0)    | 330       | (-15%) | 320       | (-21%) | 210       | (-28%) |
| <b>Swelling (%)</b>            | +6   | +6     | +4        | +4     | +5        | +5     | +3        | +3     |
|                                | Properties after immersion for 70 h at 150 °C in IRM 902 oil |        |           |        |           |        |           |        |
|                                | MF 620 U   |        | MF 660 U* |        | MF 670 U* |        | MF 680 U* |        |
| <b>Shore A hardness</b>        | 12   | (-5)   | 54        | (-6)   | 63        | (-7)   | 76        | (-4)   |
| <b>Tensile strength (MPa)</b>  | 4.2  | (22%)  | 6.8       | (-3%)  | 6.7       | (-5%)  | 5.1       | (-14%) |
| <b>Elongation at break (%)</b> | 970  | (-8%)  | 360       | (-8%)  | 350       | (-14%) | 225       | (-22%) |
| <b>Swelling (%)</b>            | +12  | +12    | +9        | +9     | +9        | +9     | +8        | +8     |
|                                | Properties after immersion for 70 h at 150 °C in IRM 903 oil |        |           |        |           |        |           |        |
|                                | MF 620 U   |        | MF 660 U* |        | MF 670 U* |        | MF 680 U* |        |
| <b>Shore A hardness</b>        | -  | -      | 40        | (-20)  | 46        | (-24)  | 60        | (-20)  |
| <b>Tensile strength (MPa)</b>  | -  | -      | 4.6       | (-34%) | 6         | (-21%) | 4         | (-32%) |
| <b>Elongation at break (%)</b> | -  | -      | 300       | (-24%) | 310       | (-24%) | 215       | (-25%) |
| <b>Swelling (%)</b>            | -  | -      | +38       | +38    | +41       | +41    | +32       | +32    |

\* With 5 parts of AD 720 additive

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# Silicones Solutions for Under the Hood Applications

## UNDER THE HOOD APPLICATIONS

Increasingly severe under-the-hood environments, most notably high temperatures due primarily to more and more parts being packed into a relatively limited space and more aggressive fluids (synthesis oil and cooling fluids) are the major factors in silicone rubber choices.



**Bluesil™ HCR are ideal solutions to make hoses that:**

- ◆ Resist the pressure while standing up to continuous high temperatures
- ◆ Withstand aggressive oils and coolants fluids
- ◆ Reduce the transfer of noise and vibrations between the mechanical parts

**Bluesil™ HCR are the material of choice to produce CVJ boots that:**

- ◆ Maintain flexibility over a wide range of temperatures
- ◆ Grease resistant and keep the grease in place
- ◆ Protect the CVJ from de-icing salts, water and dirt coming from outside



**Bluesil™ HCR are the most suitable solutions to realize spark plug boots and ignition set that:**

- ◆ Provide outstanding electrical insulation and dielectric protection
- ◆ Withstand harsh environment conditions (high/low temperatures, moisture, contact with oils and fuels)
- ◆ Meet the requirements for long lasting and durable components

## BENEFITS **BLUESIL™ HCR**

**These are the unique properties that make Bluesil™ HCR the best choice for “Under the Hood” applications:**

- ◆ Excellent heat resistance
- ◆ Good oil and coolant resistance
- ◆ Low Compression Set
- ◆ High dielectric strength
- ◆ Outstanding ageing and weathering resistance
- ◆ Easy processing (injection molding, calendaring, extrusion, etc...)



# Bluesil™ General purpose

| BLUESIL™                         |  | SERIES 200           |  |                    |  |   |  |      |  |     |  |
|----------------------------------|--|----------------------|--|--------------------|--|---|--|------|--|-----|--|
|                                  |  | Calendering moulding |  |                    |  |   |  |      |  |     |  |
| PROPERTIES                       |  | STANDARDS            |  |                    |  | No postcure / Low compression set / High resiliency |  |      |  |     |  |
|                                  |  | MF 240 U             |  | MF 280 U           |  | MF 940 U  |  |      |  |     |  |
|                                  |  | Translucent          |  | Creamy white       |  | Translucent   |  |      |  |     |  |
| GENERAL CHARACTERISTICS          | Appearance                               |                      |  |                    |  |   |  |      |  |     |  |
|                                  | Specific Gravity (G/CM <sup>3</sup> )    | ISO R1183            |  | 1.09               |  | 1.36  |  | 1.11 |  |     |  |
|                                  | Heat stability                           | 200 °C               |  | 225 °C             |  | 225 °C  |  |      |  |     |  |
| MECHANICAL PROPERTIES AFTER CURE | Catalyst type                            | E                    |  | L                  |  | E   |  | L    |  |     |  |
|                                  | Catalyst content (parts)                 | 0.9                  |  | 0.6                |  | 1.25  |  | 0.6  |  |     |  |
|                                  | Post cure                                | No                   |  | 4 hours at 200 ° C |  | 4 hours at 200 ° C                                  |  |      |  |     |  |
|                                  | Hardness, shore A                        | ASTM D 2240          |  | 46                 |  | 42  |  | 79   |  | 81  |  |
|                                  | Tensile strength (MPa)                   | ISO R37              |  | 8.5                |  | 7.6   |  | 7.3  |  | 7.6 |  |
|                                  | Elongation at break (%)                  | ISO R37              |  | 450                |  | 475   |  | 165  |  | 170 |  |
|                                  | Secant modulus at 100 % elongation (MPa) | ASTM D 412           |  | 1.29               |  | 0.98  |  | 5.2  |  | 5.3 |  |
|                                  | Tear strength (kN/m)                     | ASTM D 624 A         |  | 12                 |  | 12  |  | 16   |  | 17  |  |
|                                  | Compression set (22 h/177 °C/25 %)       | ASTM D 395 B         |  | 17                 |  | 8   |  | 31   |  | 10  |  |
|                                  | Rebound resiliency (%)                   | ISO 4662             |  | 68                 |  | 64  |  | 52   |  | 48  |  |

# Bluesil™ HCR Specialties

| BLUESIL™ HCR                     |  | SERIES 600  |  |             |  |             |  |             |  |     |  |
|----------------------------------|--|---|--|-------------|--|-------------|--|-------------|--|-----|--|
|                                  |  | Moulding extrusion calendering  |  |             |  |             |  |             |  |     |  |
| PROPERTIES                       |  | STANDARDS   |  |             |  |             |  |             |  |     |  |
|                                  |  | Translucent elastomer / Excellent processing properties / Good compromise between tear strength and compression set |  |             |  |             |  |             |  |     |  |
|                                  |  | MF 620 U  |  | MF 660 U    |  | MF 670 U    |  | MF 680 U    |  |     |  |
|                                  |  | Translucent   |  | Translucent |  | Translucent |  | Translucent |  |     |  |
| GENERAL CHARACTERISTICS          | Appearance                               |   |  |             |  |             |  |             |  |     |  |
|                                  | Specific Gravity (G/CM <sup>3</sup> )    | ISO R1183   |  | 1.06        |  | 1.16        |  | 1.18        |  |     |  |
|                                  | Heat stability                           | 200 °C  |  | 200 °C      |  | 200 °C      |  | 220 °C      |  |     |  |
| MECHANICAL PROPERTIES AFTER CURE | Catalyst type                            | E   |  | L           |  | E           |  | L           |  |     |  |
|                                  | Catalyst content (parts)                 | 0.8   |  | 0.6         |  | 1.25        |  | 0.6         |  |     |  |
|                                  | Post cure                                | No  |  | No          |  | No          |  | No          |  |     |  |
|                                  | Hardness, shore A                        | ASTM D 2240   |  | 24          |  | 17          |  | 60          |  | 60  |  |
|                                  | Tensile strength (MPa)                   | ISO R37   |  | 4.1         |  | 5.1         |  | 7.6         |  | 7.5 |  |
|                                  | Elongation at break (%)                  | ISO R37   |  | 700         |  | 1,050       |  | 355         |  | 390 |  |
|                                  | Secant modulus at 100 % elongation (MPa) | ASTM D 412  |  | 0.46        |  | 0.37        |  | 2.1         |  | 2   |  |
|                                  | Tear strength (kN/m)                     | ASTM D 624 A  |  | 7           |  | 7           |  | 17          |  | 18  |  |
|                                  | Compression set (22 h/177 °C/25 %)       | ASTM D 395 B  |  | 30          |  | 28          |  | 15          |  | 16  |  |
|                                  | Rebound resiliency (%)                   | ISO 4662  |  | 63          |  | 51          |  | 55          |  | 54  |  |



## Bluestar Silicones Mix & Fix Centers® network

In order to be closer to your needs, **Bluestar Silicones** has specialized formulation and packaging units: the **Mix & Fix Centers®**

Specialized in heat curing silicone rubbers (HCR), the Mix & Fix Centers® are located at the center of major rubber and elastomer converter regions. Besides selling master batches and other products, these centers develop, within extremely short lead times, products according to your specifications and your equipments.

**The Bluesil™ HCR range can be used to make up your own silicone elastomer compound. Call your Mix & Fix Center® to**

- > Propose batch formulations.
- > Prepare samples.
- > Deliver ready-to-use compounds in the colors, presentation, and curing system of your choice.
- > Formulate compounds containing some exclusive additives and catalysts (such as platinum catalyst).

| SERIES 900   |     |             |     |             |     |                    |     |
|--|-----|-------------|-----|-------------|-----|--------------------|-----|
| Calendering extrusion moulding   |     |             |     |             |     |                    |     |
| Translucent<br>compromise between resiliency compression set and tear strength |     |             |     |             |     |                    |     |
| MF 950 U   |     | MF 960 U    |     | MF 970 USP  |     | MF 980 U           |     |
| Creamy white   |     | Translucent |     | Translucent |     | Translucent        |     |
| 1.11   |     | 1.15        |     | 1.17        |     | 1.18               |     |
| 200 °C   |     | 200 °C      |     | 225 °C      |     | 200 °C             |     |
| E  | L   | E           | L   | E           | L   | E                  | L   |
| 1.25   | 0.6 | 1.25        | 0.6 | 1.25        | 0.6 | 1.25               | 0.6 |
| No   |     | No          |     | No          |     | 4 hours at 200 ° C |     |
| 52   | 46  | 58          | 57  | 68          | 67  | 78                 | 81  |
| 9.7  | 6.8 | 8.5         | 7.7 | 8.5         | 8.8 | 8                  | 8.2 |
| 480  | 485 | 320         | 320 | 380         | 500 | 230                | 230 |
| 1.3  | 1   | 2.14        | 1.8 | 2.1         | 1.8 | 3.8                | 4.4 |
| 14   | 15  | 17          | 18  | 20          | 21  | 16                 | 18  |
| 52   | 27  | 38          | 16  | 60          | 25  | 34                 | 20  |
| 65   | 52  | 55          | 54  | 51          | 53  | 60                 | 66  |

| THT SERIES               |     |                    |     |                    |     |                    |     |                    |     | HD SERIES  |              |
|--------------------------|-----|--------------------|-----|--------------------|-----|--------------------|-----|--------------------|-----|--|--------------|
| Moulding extrusion       |     |                    |     |                    |     |                    |     |                    |     | Moulding extrusion calendering   |              |
| Very high heat stability |     |                    |     |                    |     |                    |     |                    |     | Excellent compromise between compression set and tear strength<br>Very good heat stability |              |
| MM 40 THT                |     | MM 50 THT          |     | MM 60 THT          |     | MM 70 THT          |     | MF 980 U           |     | HD 1060  | HD 1070      |
| Creamy white             |     | Creamy white       |     | Creamy white       |     | Creamy white       |     | Translucent        |     | Creamy white   | Creamy white |
| 1.09                     |     | 1.13               |     | 1.16               |     | 1.19               |     | 1.18               |     | 1.18   | 1.18         |
| 300 °C                   |     | 300 °C             |     | 300 °C             |     | 300 °C             |     | 200 °C             |     | 250 °C   | 250 °C       |
| E                        | L   | E                  | L   | E                  | L   | E                  | L   | E                  | L   | L  | L            |
| 1.25                     | 0.6 | 1.25               | 0.6 | 1.25               | 0.6 | 1.25               | 0.6 | 1.25               | 0.6 | 0.6  | 0.6          |
| 4 hours at 200 ° C       |     | 4 hours at 200 ° C |     | 4 hours at 200 ° C |     | 4 hours at 200 ° C |     | 4 hours at 200 ° C |     | 4 hours at 200 ° C   |              |
| 39                       | 37  | 46                 | 46  | 56                 | 56  | 64                 | 64  | 78                 | 81  | 61   | 71           |
| 6.1                      | 7.4 | 7.4                | 7.6 | 9.4                | 9.4 | 9.5                | 9.5 | 8                  | 8.2 | 10.5   | 10.5         |
| 470                      | 530 | 485                | 570 | 460                | 505 | 410                | 530 | 230                | 230 | 430  | 380          |
| 0.8                      | 0.8 | 1                  | 0.8 | 1.3                | 1.2 | 1.7                | 1.3 | 3.8                | 4.4 | 2.3  | 3.2          |
| 12                       | 14  | 16                 | 18  | 19                 | 20  | 20                 | 25  | 16                 | 18  | 22   | 24           |
| 31                       | 15  | 43                 | 21  | 42                 | 28  | 54                 | 33  | 34                 | 20  | 7  | 7            |
| 60                       | 52  | 54                 | 49  | 50                 | 44  | 43                 | 34  | 60                 | 66  | 55   | 59           |