Bluesil™ FIM
polyaddition HCR
for increased productivity

Optimized productivity is often achieved by complex mold design (increasing number of cavities). This in turn makes temperatures and material critical parameters more difficult to control. Part quality can consequently suffer with anormally high reject rates.
Constantly at the forefront of innovation, Bluestar Silicones is offering a range of platinum catalyzed silicones (polyaddition reaction):
> Bluesil™ FIM polyaddition HCR (Fast cure Injection Molding).
> Bluesil™ FIM polyaddition HCR can be easily processed using mold and injection presses already used in the rubber industry, without further investment.

> Advantages of Bluesil™ FIM polyaddition HCR

■ **Significant increase in productivity**
> Cure kinetics 2 to 3 times quicker than those measured on peroxide grades

■ **Outstanding processability**
> Excellent demolding (no surface tack)
> Significant reduction in reject rate: very good tear strength at high temperature, curing relatively insensitive to temperature uniformity (complex molds, multi-cavity molds, thick-section part, etc.)

■ **Very good mechanical properties**
> Excellent compromise between elongation at break / tear strength / compression set

■ **Low temperature curability**
> Energy savings, insert molding of sensitive parts

■ **Respect for the environment and improved conditions at work**
> Free of peroxide residues
> Odorless vulcanizing

Bluestar Silicones. Delivering Your Potential.

BLUESTAR SILICONES

Bluesil™ FIM polyaddition HCR

Examples of ready to use compounds

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Outstandin
Good general comp
Low compression se

Gener

	Properties	Standards	Units	FIM 5125		FIM 5145	
General characteristics	Appearance			Transparent		Translucent	
	Specific Gravity	ISO R1183	(g/cm³)	1.06		1.1	
Mechanical properties after cure(1)	Post cure			No	4 h at 200 °C	No	4 h at 200 °C
	Hardness, shore A	ASTM D 2240		19	28	42	47
	Tensile strength	ISO R37	(MPa)	5.9	4.9	7.8	7.3
	Elongation at break	ISO R37	(%)	1460	910	700	540
	Tear strength	ASTM D 624 A	(kN/m)	12	15	29	21
	Compression set (22 h/177 °C/25%)	ASTM D 395 B	(%)	-	26	-	21
	Rebound resilience	ISO 4662	(%)	59	63	61	62

(1) Properties measured on 2 mm ASTM compression molded specimens. Cure time: 5 min at 170 °C

Bluesil™ FIM polyaddition HCR

To further enhance its customer service, Bluestar Silicones distributes Bluesil™ FIM polyaddition HCR as ready-mixed compounds from its "Mix & Fix Centers®".

> Determining which compounds are the most economical, the best suited to processing conditions and the highest performing.

Depending on specific requirements, "Mix & Fix Centers®" determine which tailored formulation best meets needs in term of:

Cost
> Seeking the lowest cost price

Processing
> Optimization of the curing system: determining the best compromise between productivity/processing constraints
> Specific performance attributes for each production unit

Performance
> Ready-mixed compounds supplied within the best lead times
> Analytical report on the characteristics and performance levels compared with the specifications and special requirements, advice on specialized testing laboratories, etc.

"Mix & Fix Centers®" have the job of preparing samples for approval and delivering special ready-mixed products, in the best timing.

"Mix & Fix Centers®" represent an invaluable potential resource for rubber converters, engineering offices, R&D establishments and materials testing facilities.

Scorch time (TS2)

The scorch time for Bluesil™ FIM polyaddition HCR blends can be increased or decreased without significantly changing the cure rate or cross link density.

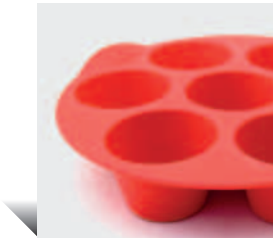
> Bluesil™ FIM polyaddition HCR offers the possibility of optimizing molding characteristics to your requirements.

When using peroxide blends, it is common to vary the peroxide content to improve the scorch time. The small gain in scorch time obtained is always accompanied by a significant change in cure rate and cross link density.

Reduction in reject rates

It is also possible to increase the scorch time (TS2) by reducing the mold temperature without significantly affecting productivity. For peroxide blends, a lower molding temperature causes a dramatic increase in cure time.

rocessability ng cure rate promise of properties et and high resilience				Excellent processability Outstanding cure rate Good compromise of properties: > High tear strength > High elongation at break					
ral use				High performance					
FIM 5160		FIM 5170		FIM 5340		FIM 5360		FIM 5375	
Translucent		Translucent		Transparent		Transparent		Transparent	
1.14		1.18		1.1		1.16		1.19	
No	4 h at 200 °C	No	4 h at 200 °C	No	4 h at 200 °C	No	4 h at 200 °C	No	4 h at 200 °C
56	61	66	71	37	43	55	61	66	75
7.6	7.5	7.8	8.3	7.7	7.6	9.9	9.7	9.7	10.5
410	370	670	650	820	680	900	770	785	640
17	16	28	22	36	30	48	44	49	37
-	18	-	23	-	25	-	40	-	44
56	59	53	56	48	42	46	48	45	48



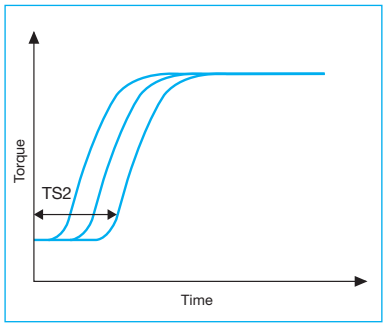
Impact of temperature variations

> The FIM system is much less sensitive than peroxide systems to temperature variations.

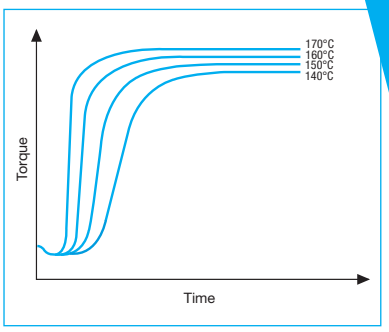
Depending on the geometry of the molded part and elastomer used, the temperature can vary by between 10 and 20 °C from the center to the mold surface.

With peroxide blends, these temperature differences can cause wide variations in cure kinetics and in the elastomer's physical properties: in a multi-cavity mold, certain parts can be correctly cured while others are still under cured.

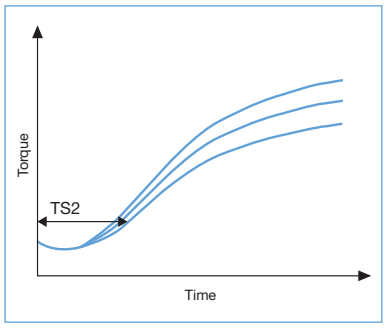
The platinum system in Bluesil™ FIM polyaddition HCR means that the cross link density changes very little: the end properties of the elastomer are uniform and all the parts in a complex mold are cured at the same time.



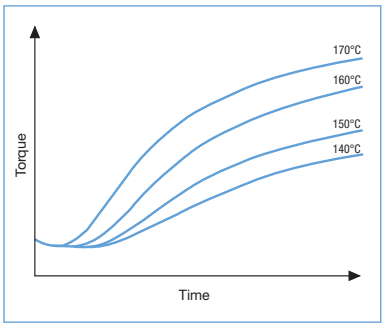
■ Bluesil™ FIM



■ Bluesil™ FIM



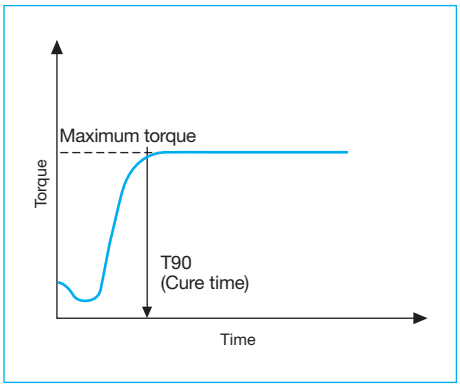
■ Peroxide



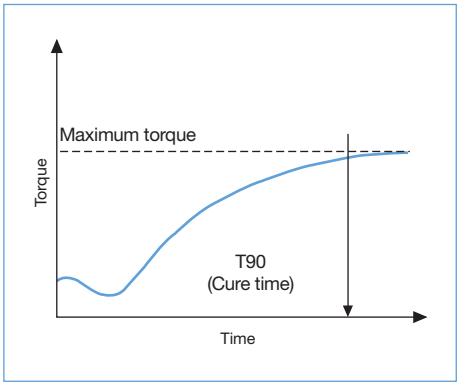
■ Peroxide

Vulcanization technology: compared curing levels

The graphs opposite illustrate the differences between the two reactions.
The graph for platinum, due to a very high cure rate, reaches maximum torque very quickly. The much quicker kinetic of Bluesil™ FIM polyaddition HCR causes a significant reduction in finished article production costs.
The injection-molding cycle time can be cut by two or even three times compared with peroxide versions, according to the dimensions and complexity of the part to be molded.
The much slower cure rate of peroxide elastomers means multi-cavity molds must be used to achieve reasonable production yields. It becomes more difficult to achieve optimum quality levels and reject rate increase.
The much faster cure rate of Bluesil™ FIM polyaddition HCR enable less complex molds to be used (cheaper to produce). Better temperature control and better control of material flow properties make it possible to produce finished parts to much tighter specifications.



■ Bluesil™ FIM



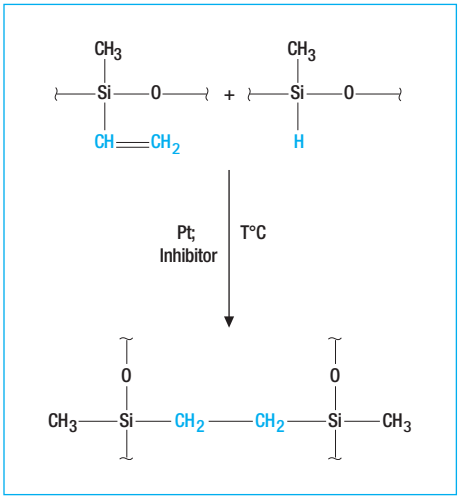
■ Peroxide

> Higher quality parts and much lower reject rate

Polyaddition crosslinking reaction

The polyaddition crosslinking reaction (first order reaction) is much quicker than that initiated by peroxides and does not generate any toxic by-products.

> No reaction by-product
> Respect for the environment
> Odorless
> Improved conditions for employees



■ General diagram