

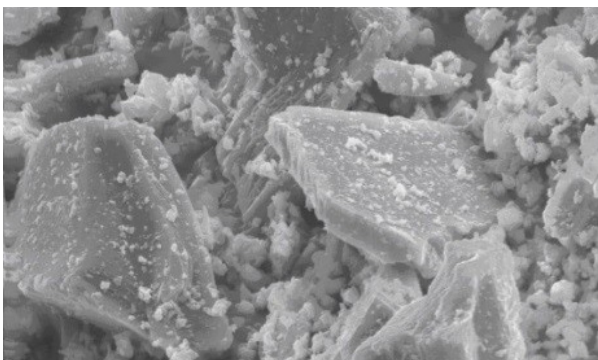
## HiFILL<sup>®</sup> N

Functional Mineral for  
Plastics and Elastomers

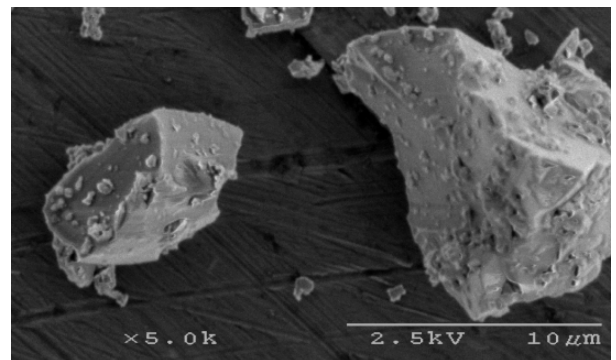
### HiFILL<sup>®</sup> N uniquely combines superior performance in silicone elastomers and compliance with OSHA's respiratory crystalline silica (RCS) regulations

COVIA's HiFILL N (nepheline syenite) is the crystalline silica-free alternative to ground or microcrystalline silica mineral fillers typically used in silicone elastomeric applications. Formulators have been adopting low crystalline silica HiFILL N due to stricter OSHA regulations on RCS, and due to HiFILL N's similar high dielectric resistance, thermal conductivity, compressive strength and UV resistance properties.

This independent study shows how HiFILL N delivers superior performance relative to Min-U-Sil<sup>®</sup> (ground silica) in silicone elastomer applications, which is yet another reason why formulators have been adopting it.



SEM Photomicrograph-HiFILL N 800



SEM Photomicrograph-Min-U-Sil 30

For more information about HiFILL N functional minerals,  
please call: 800.243.9004 or email: [Sales@CoviaCorp.com](mailto:Sales@CoviaCorp.com).



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### Comparing attributes:

Morphology	Oil Absorption	Hardness	GE Brightness	pH
<p>HIFILL N's angular morphology is similar to that of Min-U-Sil. HIFILL N is a silica-deficient sodium-potassium aluminosilicate and also exhibits high compressive strength.</p> <p>Reinforcement, compression set, tensile and elongation are similar for grades with similar particle size distribution based on similar particle shape characteristics.</p>	<p>Oil absorption ranges from 20% to 35% for HIFILL N grades with varying particle size distributions. HIFILL N rheology and viscosity are similar to Min-U-Sil at equal loadings potentially enabling higher loadings. The low oil absorption and smooth surface allows for higher filler loadings.</p>	<p>HIFILL N is 6.0 to 6.5 while Min-U-Sil is 7 on the 1-10 Mohs hardness scale. Silicone rubber and elastomers that are highly filled with either HIFILL N or Min-U-Sil will exhibit similar hardness, however NS is less abrasive than GCS which translates into longer equipment service life, reduced maintenance cost and higher productivity.</p>	<p>HIFILL N dry brightness is typically superior ranging from 89-94 in GE Brightness while Min-U-Sil brightness values range from of 88-91. HIFILL N offers brighter and less yellowness overtones in pigmented silicone elastomer application. It will enhance the colors more effectively than crystalline silica in all white and pigmented applications.</p>	<p>HIFILL N and Min-U-Sil both have excellent chemical resistance. pH of GCS is 6.5 while HIFILL N is typically in 9-10 range. Curing behaviors are similar or when silane treated.</p>

### HiFILL N and Min-U-Sil product portfolios and properties:

Grade	*mean, μm	+325 mesh	pH	GEB	% Oil Absorption
Min-U-Sil 30	5.5	0.1	6.5	88	29
<b>HiFILL N 800</b>	<b>6.8</b>	<b>0.1</b>	<b>10.1</b>	<b>88</b>	<b>26</b>
Min-U-Sil 15	3.0	trace	6.5	88	39
<b>HiFILL N 400</b>	<b>3.6</b>	<b>0</b>	<b>10.1</b>	<b>89</b>	<b>31</b>
Min-U-Sil 10	2.0	0	6.5	91	39
<b>HiFILL N 300</b>	<b>2.1</b>	<b>0</b>	<b>10.2</b>	<b>91</b>	<b>33</b>
Min-U-Sil 5	1.0	0	6.5	88	40
<b>HiFILL N 200</b>	<b>1.5</b>	<b>0.0</b>	<b>10</b>	<b>90+</b>	<b>35</b>

\*Sedigraph mean P.S. in microns



## Comparison of physical properties in 60 Durometer hardness silicone elastomer sheet molding compound

HiFill N 400 outperforms Min-U-Sil 15 in several key physical tests and is the suitable and proven safer alternative to ground crystalline silica. The superior physical properties performance of compounds formulated with HIFILL N 400 allow for higher loadings leading to cost savings while meeting the specification.

### 60 Durometer sheet molding compound test formula

Ingredient parts	Base
60 Durometer silicone base	100.0
DBPH-50 molding catalyst	1.0
Extender	50.0

		Min-U-Sil 15 60 CG LOT 16258	HIFILL N 400 60 CG LOT 162608	Limits
ASTM Method	Test			
	Appearance	pass	pass	pass/fail
D792	S.G. (g/cc)	1.427	1.429	report
2240	Durometer (Shore A)	51 fail	56	55 to 65
D412	Tensile (PSI)	801	850	650 min
D412	Elongation (%)	343	294	100 min
D412	Modulus 100%	342	394	report
D624	Tear strength, PPI DIE B	93	90	report
D395 meth B, 70hrs at 150C	Compression set (%)	11.70	13.8	25 max
D573, 70 hrs at 225 D573, 70 hrs at 225	Dry heat resistance change in hardness (points)	+ 6.4	+2.7	+ 10 max
	change in tensile (%)	+ 3.1	+1.2	- 20 max
	Change in elongation (%)	- 40.9 fail	- 26.5	- 40 max
D2137 at -62.2°C	Low temp resistance brittleness	pass	pass	pass/fail
D471 70 hrs at 100C	Water immersion Volume change	- 0.75	- 0.41	+ 5 max

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