Data on No Post-Cure Silicone Rubber

Millable Silicone Rubber **LIMS**

Shin-Etsu Silicone is expanding its lineup of silicone rubber that does not require post-cure.
We have summarized the advantages of no post-cure products.
No post-cure silicone rubber offers advantages over conventional products.

What is post-cure?

What is the process and why is it performed?

The application of additional heat to silicone rubber after primary cure.

∗ It is usually heated at 200°C for about 4 hours in an oven.

The reason

1. **Removal of low-molecular-weight siloxanes that can cause electrical contact failure**
2. **Removal of decomposition products of curing agents used in rubber molding in case of peroxide cure**
3. **Stabilization and improvement of physical properties**
   - After the primary cure, proceed with the crosslinking reaction of remaining functional groups
   - Increases hardness, reduces elongation, and improves compression-set properties

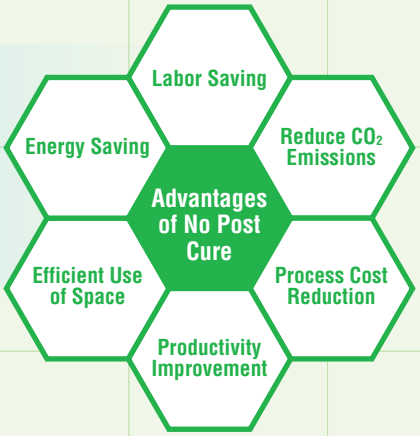
Why is post-cure unnecessary?

ΣD_3-D_8: <350 ppm

The amount of low molecular weight siloxane has been significantly reduced compared to conventional products.

Advantages of no post-cure

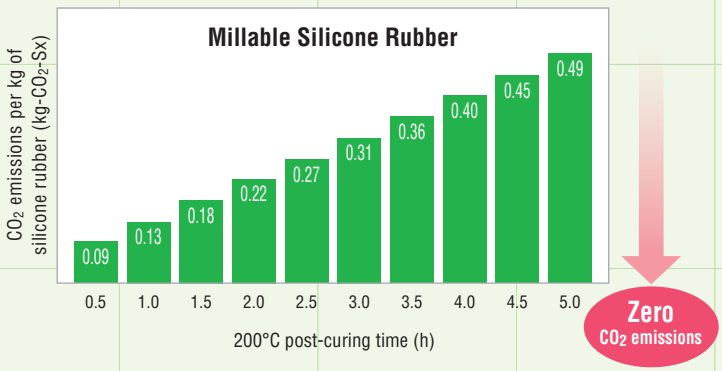
- **The energy required for post-cure is no longer necessary, and CO_2 emissions are also eliminated.**
- **This eliminates one step and eliminates the need for ovens.**
- **When combined with injection molding, millable rubber can also significantly automate processes and reduce labor.**
- **No need to dispose of low-molecular-weight siloxane.**



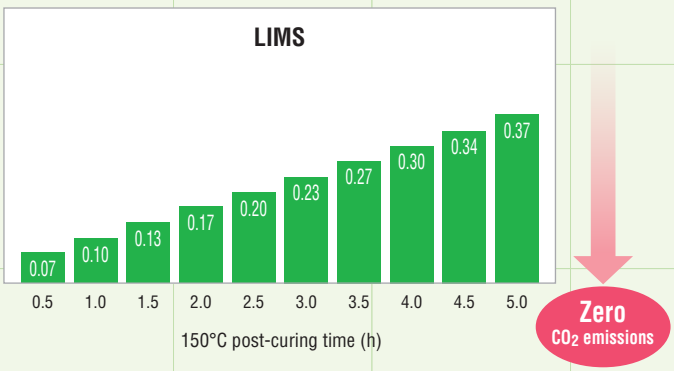
We calculated how much CO_2 is emitted during post-cure.

■ **CO_2 emissions from post-cure**

CO_2 emissions from post-cure are zero



[Our calculations]
Product: KNP-561-U Product weight: 60 g/piece
Quantity manufactured: 26,667 piece, Material: 1.6 t, Drying equipment input amount 35.0 kg/m³
Post-curing conditions: Heating time 0.5 h + 200°C Predetermined time, Capacity: 1,500 L
∗ TEPCO Energy Partner, Inc.
FY2022 CO_2 Emissions Coefficient: 0.457 kg-CO_2/kWh



[Our calculations]
Product: KE-2017-40-A/B
Product weight: 16 g/piece
Quantity manufactured: 100,000 piece, Material: 1.6 t, Drying equipment input amount 35.0 kg/m³
Post-curing conditions: Heating time 0.5 h+150°C Predetermined time, Capacity: 1,500 L
∗ TEPCO Energy Partner, Inc.
FY2022 CO_2 Emissions Coefficient: 0.457 kg-CO_2/kWh

We will continue to expand no post-cure product lineup with advanced functionality to meet the

We compared post-cured products with no post-cure products.
The rubber properties are almost the same.
Reducing the energy required for molding reduces CO_2 emissions.
The molding time will also be shorter, and by eliminating the ovens, the space can be utilized more effectively.

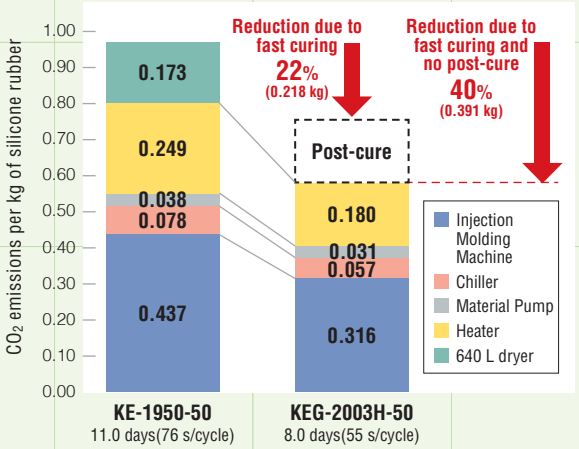
Save energy and time.
The rubber properties are the same.

■ Comparison between standard grade LIMS and no post-cure LIMS

Grade		Standard	No post-cure
Parameter \ Product Name		KE-1950-50	KEG-2003H-50
Standard curing condition	Primary cure	120°C×5 min	120°C×5 min
	Post-cure	150°C×1 h	-
Hardness Durometer A		49	51
Density at 23°C	g/cm³	1.13	1.13
Linear shrinkage		2.5	2.5
Tensile strength	MPa	8.9	10.6
Elongation at break	%	560	790
Tear strength	kN/m	37	40

(Not specified values)

■ CO_2 emissions per kg of product during LIMS molding (Convert electricity consumption into CO_2)



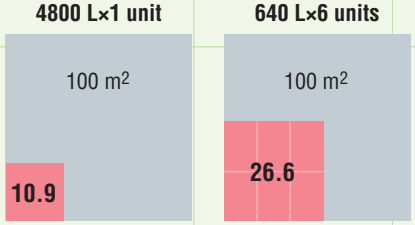
[Our calculations] Product weight: 16 g/piece
Quantity manufactured: 100,000 piece, Material: 1.6 t
Injection molding machine: 160 t clamping force, hydraulic machine, Mold: 8 cavities
Molding temperature: 150°C

■ No post-cure LIMS space saving calculation

Dryer capacity	Required number of units	Installation space m²	Number of batches	CO_2 Emissions kg
4800 L	1	10.9	10	0.160
3600 L	1	10.9	13	0.166
1500 L	2	14.1	31	0.167
1000 L	3	15.9	46	0.168
640 L	6	26.6	72	0.204

[Our calculations] Processing volume: 100,000 units/5 days, Drying equipment input amount 35.0 kg/m³
Post-curing conditions: Heating time: 0.5 h+150°C×2 h

■ Space required for installing the ovens



Based on our calculations

Also contributes to space saving.

Product lineup of no post-cure silicone rubber

In addition to the current lineup of LIMS KE-2017 series, KE-2019 series, and KEG-2003H series that do not require post-cure, we have developed a new no post-cure millable silicone rubber product.

For information on no post-cure LIMS, please download the catalog here ▶

■ No post-cure millable silicone rubber

Type	PO*	Addition	PO*	Addition	PO*	Addition	Addition
Parameter \ Product name	KNP-541P-U	KNP-541-U	KNP-551P-U	KNP-551-U	KNP-561P-U	KNP-561-U	KNP-571-U
Plasticity	132	147	174	208	239	356	370
Curing agent	X-93-1910/1 part	X-93-1893A/0.5 part X-93-1893B/2 part	X-93-1910/1 part	X-93-1893A/0.5 part X-93-1893B/2 part	X-93-1910/1 part	X-93-1893A/0.5 part X-93-1893B/2 part	X-93-1893A/0.5 part X-93-1893B/2 part X-93-1918/1 part
Standard curing condition	165°C×10 min	120°C×10 min	165°C×10 min	120°C×10 min	165°C×10 min	120°C×10 min	120°C×10 min
Hardness Durometer A	42	41	50	50	58	61	71
Density at 23°C g/cm³	1.08	1.09	1.10	1.14	1.14	1.19	1.18
Tensile strength MPa	6.5	7.1	6.3	10.6	10.0	11.0	10.8
Elongation at break %	30	550	380	610	410	610	380
Low-molecular-weight siloxane content $\sum D_3$-D_8 ppm	<350	<350	<350	<350	<350	<350	<350

✻ Peroxide

(Not specified values)

Rubber physical properties reference values

Rebound resilience %	77	71	76	60	69	50	62
Compression set* %	17	21	9	25	10	42	25

✻ Measurement conditions: 150°C×22 h

needs of our customers.

For product inquiries and consultations **Silicone Division Sales and Marketing Department III TEL +81-(0)3-6812-2408**