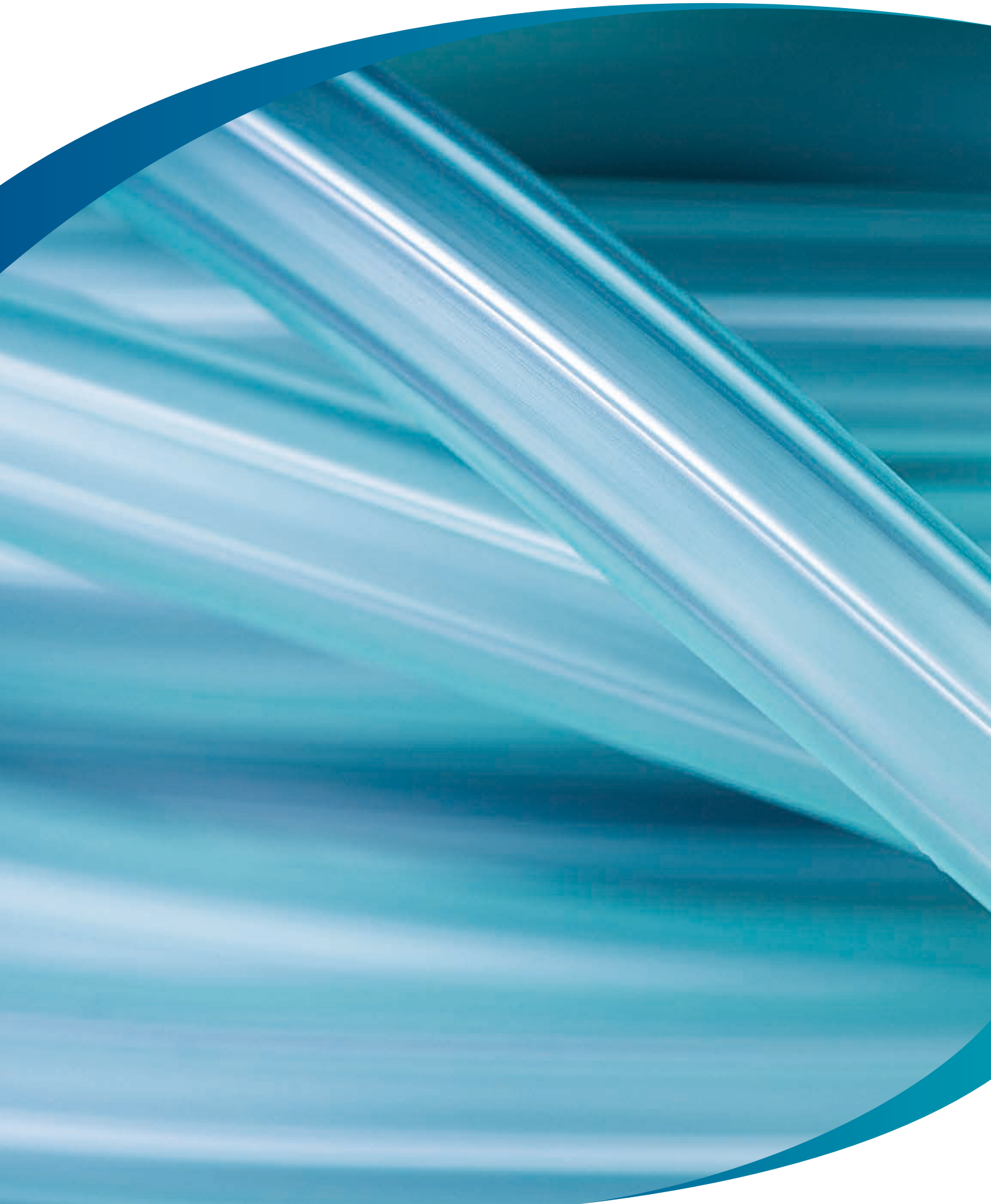
No-Post-Cure Silicone Rubber

Shin-Etsu Silicone



Energy Savings

Labor Savings

Space Optimization

No-Post-Cure Silicone Rubber
that transforms manufacturing operations

No-post-cure silicone rubber is a product developed using our proprietary technologies cultivated over many years. It addresses today's needs by reducing CO_2 emissions and energy consumption during manufacturing, improving productivity through shorter production processes, and optimizing space by eliminating the need for drying ovens.

Features

1 No-Post-Cure Process Required

Post-cure process normally required—heating in a drying oven—can be eliminated.

2 Reduced Low-Molecular-Weight Siloxanes

The product contains reduced levels of low-molecular-weight siloxanes, which may cause electrical contact failures and sensor malfunctions.

3 Contributes to CO_2 Emission Reduction

The electricity consumption required for the post-cure process can be reduced, thereby helping to lower CO_2 emissions.

4 A Shorter Production Process

Eliminating the post-cure process will shorten manufacturing times and improve productivity.

5 Contributes to Space Optimization

Because no drying oven is required, factory space can be used more efficiently.

6 Contributes to Consistent Quality

Eliminating the post-cure process eliminates variations in the residual amount of low-molecular-weight siloxanes caused by temperature variations inside the drying oven and by the placement of molded products.

7 Reduced Risk of Foreign-Matter Adherence

Eliminating the post-cure process reduces the risk of foreign-matter contamination.

8 Compatible with both Millable and LSR (LIMS) types

Our product lineup includes options for both Millable and LSR (LIMS), allowing you to select the product best suited to your application and molding method.

Purpose of Post-Cure

Post-cure, also known as post-curing, generally refers to a process in which products are heated in a drying oven at approximately 200°C for four hours. It is primarily performed for the following purposes:

- Removal of low-molecular-weight siloxanes remaining in molded products, which may cause electrical contact failures or be unacceptable for healthcare applications.
- Removal of decomposition products from curing agents used for rubber molding
- Stabilization and improvement of physical properties

Benefits of No-Post-Cure

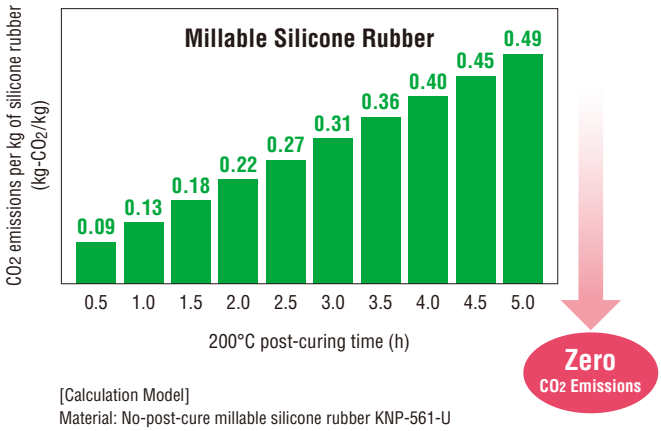
Eliminating post-cure provides benefits in various areas, including the environment, production, and facilities.

Area	Benefits
Environment	Reduced CO_2 emissions, energy savings, and reduced environmental impact
Production	Shorter processes, improved productivity, and reduced labor requirements
Facilities	No drying oven required, reduced maintenance, and improved factory space utilization
Quality	Reduced low-molecular-weight siloxanes in molded products, more consistent quality, and reduced risk of particulate contamination
Cost	Reduced electricity costs, labor hours, and equipment maintenance costs

Reference Data: CO_2 Emission Reduction Data

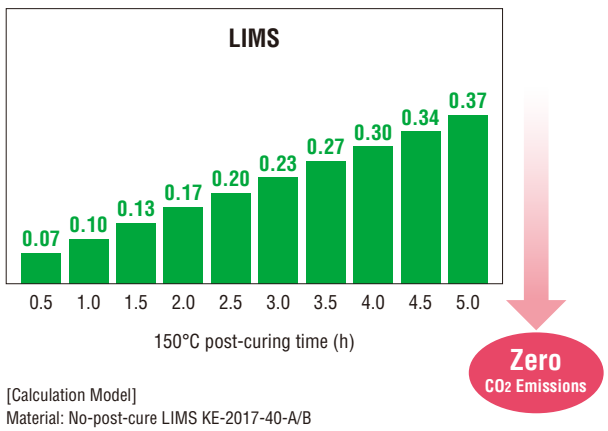
CO_2 emissions generated during the post-cure can be reduced to zero.

■ **CO_2 Emissions from post-cure**



[Calculation Model]
Material: No-post-cure millable silicone rubber KNP-561-U
Product weight: 60 g/piece
Production quantity: 26,667 pieces (1.6 tons of material)
Quantity loaded into the constant-temperature oven: 35.0 kg/m³
Post-cure conditions: Heating-up time of 0.5 hours plus the specified time at 200°C
Oven capacity: 1,500 L

*CO_2 emission factor for fiscal 2022 published by TEPCO Energy Partner, Incorporated: 0.457 kg-CO_2/kWh

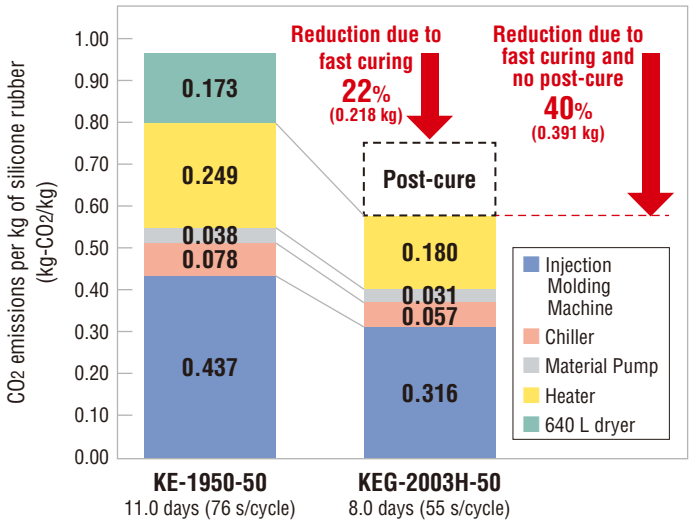


[Calculation Model]
Material: No-post-cure LIMS KE-2017-40-A/B
Product weight: 16 g/piece
Production quantity: 100,000 pieces (1.6 tons of material)
Quantity loaded into the constant-temperature oven: 35.0 kg/m³
Post-cure conditions: Heating-up time of 0.5 hours plus the specified time at 150°C
Oven capacity: 1,500 L

*CO_2 emission factor for fiscal 2022 published by TEPCO Energy Partner, Incorporated: 0.457 kg-CO_2/kWh

The CO_2 reduction benefits shown are estimates calculated by our company for the secondary curing process.
The calculation results vary depending on equipment specifications, processing volume, molding conditions, electricity consumption, and the CO_2 emission factor of the electricity provider.

■ CO_2 emissions per kilogram of product in LIMS molding (Electricity consumption converted into CO_2 emissions)



[Calculation Model]
Product weight: 16 g/piece, Production quantity: 100,000 pieces (1.6 tons of material)
Injection molding machine: 160-ton hydraulic clamping machine, Mold: 8 cavities
Molding temperature: 150°C

■ Comparison of Properties: Standard LIMS vs. No-Post-Cure LIMS

Grade		Standard	No-post-cure
Parameter \ Product name		**KE-1950-50**	**KEG-2003H-50**
Standard curing conditions	Primary cure	120°C×5 min	150°C×5 min
	Post-cure	150°C×1 h	Not required
Hardness Durometer A		49	51
Density at 23°C	g/cm³	1.13	1.13
Linear shrinkage at 150°C	%	2.5	2.5
Tensile strength	MPa	8.9	10.6
Elongation at break	%	560	790
Tear strength Crescent piece	kN/m	37	40

(Not specified values)

Data for Estimating Factory Space Savings by Eliminating the Need for a Drying Oven

■ Estimated Space Savings with No-Post-Cure LIMS

Drying oven capacity	Required units	Installation space m²	Number of batches	CO_2 emissions kg
4,800 L	1	10.9	10	0.160
3,600 L	1	10.9	13	0.166
1,500 L	2	14.1	31	0.167
1,000 L	3	15.9	46	0.168
640 L	6	26.6	72	0.173

[Calculation Model]
Processing volume: 100,000 pieces over five business days
Quantity loaded into the constant-temperature oven: 35 kg/m³
Post-cure conditions: Heating-up time of 0.5 h + 150°C×2 h

Product Types

Silicone rubber is broadly classified into two types: solid millable silicone rubber and liquid silicone rubber (LIMS).

Item	Millable type	LSR (LIMS) type*
Product types	KNP-5xx-U series (addition-cure type) KNP-5xxP-U series (peroxide-cure type)	KEG-2003H series (high-tear-strength type) KE-2017 series (oil-bleed type) KE-2019 series (low-compression-set type) KE-2097 series (PC-adhesive type) KE-2098 series (PA- and metal-adhesive type)
Main molding methods	Compression molding, extrusion molding, and other methods	Injection molding
Features	Product form: solid Highly versatile	Product form: liquid Excellent for automation and mass production
Main applications	General industrial components and other applications	Precision components, mass-produced components, and other applications

✻ "LSR" stands for Liquid Silicone Rubber, and "LIMS" stands for Liquid Injection Molding System.
✻ "LIMS" is a registered trademark of Shin-Etsu Chemical Co., Ltd.

Examples of Applications

Silicone rubber combines excellent properties, including heat resistance, cold resistance, weather resistance, electrical characteristics, and safety. It is used in a wide range of products and industries, from automobiles and electrical and electronic equipment to office automation equipment, food-related products, and household goods.

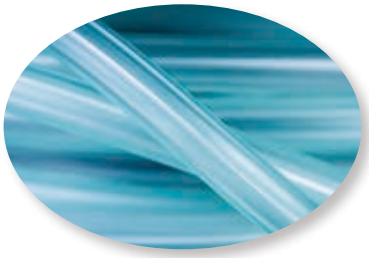




- **Automotive components**
- **Electrical and electronic components**
- **Office automation equipment components**
- **Food-related materials and components**
- **Medical-related materials and components**
- **General industrial components**
- **Household goods and other applications**







✻ When using these products for food-contact applications, medical-related applications, or other applications subject to laws and regulations, confirm their compliance with the applicable laws, regulations, and standards in advance.

General Properties

■ Millable type

Type		PO*		Addition		
Parameter \ Product name		**KNP-551P-U**	**KNP-561P-U**	**KNP-551-U**	**KNP-561-U**	**KNP-571-U**
Conformity Standard	USP class VI			○	○	○
	ISO 10993			○	○	○
Appearance		Milky white translucent	Milky white translucent	Milky white translucent	Milky white translucent	Milky white translucent
Williams plasticity (10 min after remix)		174	239	208	356	370
Curing agent/ Standard adding quantity phr		C-8B-NP/1.0	C-8B-NP/1.0	C-25A-NP/0.5 C-25B-NP/2.0	C-25A-NP/0.5 C-25B-NP/2.0	C-25A-NP/0.5 C-25B-NP/2.0 X-93-1918/1.0
Standard curing conditions		165°C×10 min	165°C×10 min	120°C×10 min	120°C×10 min	120°C×10 min
Hardness Durometer A		50	58	50	61	71
Density	g/cm³	1.10	1.14	1.14	1.19	1.18
Tensile strength	MPa	6.3	10.0	10.6	11.0	10.8
Elongation at break	%	380	410	610	610	380
Low-molecular-weight siloxane content ΣD_3-D_8	ppm	350>	350>	350>	350>	350>

✻ Peroxide

(Not specified values)

■ LSR (LIMS) type

Grade		No-post-cure, high tear strength				
Parameter \ Product name		**KEG-2003H-30-A/B**	**KEG-2003H-40-A/B**	**KEG-2003H-50-A/B**	**KEG-2003H-60-A/B**	**KEG-2003H-70-A/B**
Conformity Standard	FDA	○	○	○	○	○
	BfR	○	○	○	○	○
	USP class VI	○	○	○	○	○
	ISO10993	○	○	○	○	○
	UL94 HB	○	○	○	○	○
Appearance		Translucent	Translucent	Translucent	Translucent	Translucent
Viscosity A/B	Pa·s	740/690	900/960	1030/1000	750/700	1040/1010
Curing speed at 130°C (MDR) Sec	T_{10}	23	23	21	22	30
	T_{90}	44	45	41	43	61
Standard curing conditions	Primary cure	150°C×5 min	150°C×5 min	150°C×5 min	150°C×5 min	150°C×5 min
	Post-cure	—	—	—	—	—
Hardness Durometer A		31	41	51	60	69
Density at 23°C	g/cm³	1.13	1.13	1.13	1.13	1.14
Linear shrinkage at 150°C	%	2.5	2.5	2.5	2.5	2.4
Tensile strength	MPa	9.3	9.1	10.6	9.9	9.1
Elongation at break	%	900	830	790	660	490
Tear strength Crescent piece	kN/m	30	36	40	46	46
Compression set	%	21*	15*	15*	19*	28*

✻ Curing condition: 150°C×15 min, testing condition: 120°C×22 h

(Not specified values)

A "○" in the Applicable Standards column indicates that the product complies with, or can be adapted to meet, the applicable standard.
For further details, please contact our sales representative.

The curing conditions indicated are standard conditions.
The actual curing conditions may need to be adjusted depending on the product shape, mold structure, molding machine, and mass-production conditions.

General Properties

Parameter \ Grade / Product name		No-post-cure, oil bleeding				No-post-cure, low compression set			
		KE-2017-20-A/B	**KE-2017-30-A/B**	**KE-2017-40-A/B**	**KE-2017-50-A/B**	**KE-2019-30-A/B**	**KE-2019-40-A/B**	**KE-2019-50-A/B**	**KE-2019-60-A/B**
Appearance		Translucent	Translucent	Translucent	Translucent	Translucent	Translucent	Translucent	Translucent
Viscosity A/B	Pa·s	610/490	1940/1590	1790/1550	2030/1710	342/370	327/334	840/710	693/773
Curing speed at 130°C (MDR)	T_{10}	31	44	35	33	32	31	25	33
Sec	T_{90}	86	85	76	72	95	78	52	63
Standard curing conditions	Primary cure	150°C×10 min	150°C×10 min	150°C×10 min	150°C×10 min	150°C×10 min	150°C×10 min	150°C×10 min	150°C×10 min
	Post-cure	—	—	—	—	—	—	—	—
Hardness Durometer A		24	32	43	50	32	40	53	59
Density at 23°C	g/cm³	1.10	1.14	1.14	1.14	1.12	1.12	1.15	1.14
Linear shrinkage at 150°C	%	2.5	2.4	2.4	2.4	2.5	2.5	2.4	2.4
Tensile strength	MPa	7.4	8.9	9.0	9.3	8.7	9.5	9.8	9.3
Elongation at break	%	840	740	620	480	738	670	565	507
Tear strength Angle piece	kN/m	13	22	34	40	20	31	42	43
Compression set	%	13*	18*	18*	18*	15*	14*	16*	41*

* Curing condition: 150°C×15 min, testing condition: 150°C×70 h

(Not specified values)

Parameter \ Grade / Product name		No-post-cure, PC-adhesive type				No-post-cure, PA- and metal-adhesive type		
		KE-2097-30-A/B	**KE-2097-40-A/B**	**KE-2097-50-A/B**	**KE-2097-60-A/B**	**KE-2098-40-A/B**	**KE-2098-50-A/B**	**KE-2098-60-A/B**
Appearance		Translucent	Translucent	Translucent	Translucent	Translucent	Translucent	Translucent
Viscosity A/B	Pa·s	620/670	964/898	500/546	623/613	819/797	890/850	870/790
Curing speed at 130°C (MDR)	T_{10}	19	21	21	25	23	24	22
Sec	T_{90}	55	44	47	63	60	54	47
Standard curing conditions	Primary cure	150°C×5 min	150°C×5 min	150°C×5 min	150°C×5 min	150°C×5 min	150°C×5 min	150°C×5 min
	Post-cure	—	—	—	—	—	—	—
Hardness Durometer A		30	37	47	60	40	47	61
Density at 23°C	g/cm³	1.13	1.14	1.13	1.14	1.14	1.15	1.14
Linear shrinkage at 150°C	%	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Tensile strength	MPa	9.8	8.9	9.7	9.7	9.2	8.5	8.9
Elongation at break	%	820	720	700	380	700	610	430
Tear strength Crescent piece	kN/m	13	25	34	45	35	36	42
Compression set	%	15*	—	—	—	—	—	—

* Curing condition: 120°C×15 min, testing condition: 150°C×22 h

(Not specified values)

The curing conditions indicated are standard conditions.
The actual curing conditions may need to be adjusted depending on the product shape, mold structure, molding machine, and mass-production conditions.

Note: For information on packaging and handling precautions, please refer to the brochure titled "Silicone Rubber for Molding."

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Naoetsu Plant	ISO 9001 (JCQA-0018)	ISO 14001 (JCQA-E-0064)
Takefu Plant	ISO 9001 (JQA-0479)	ISO 14001 (JQA-EM0298)

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