

Waytop Microspheres

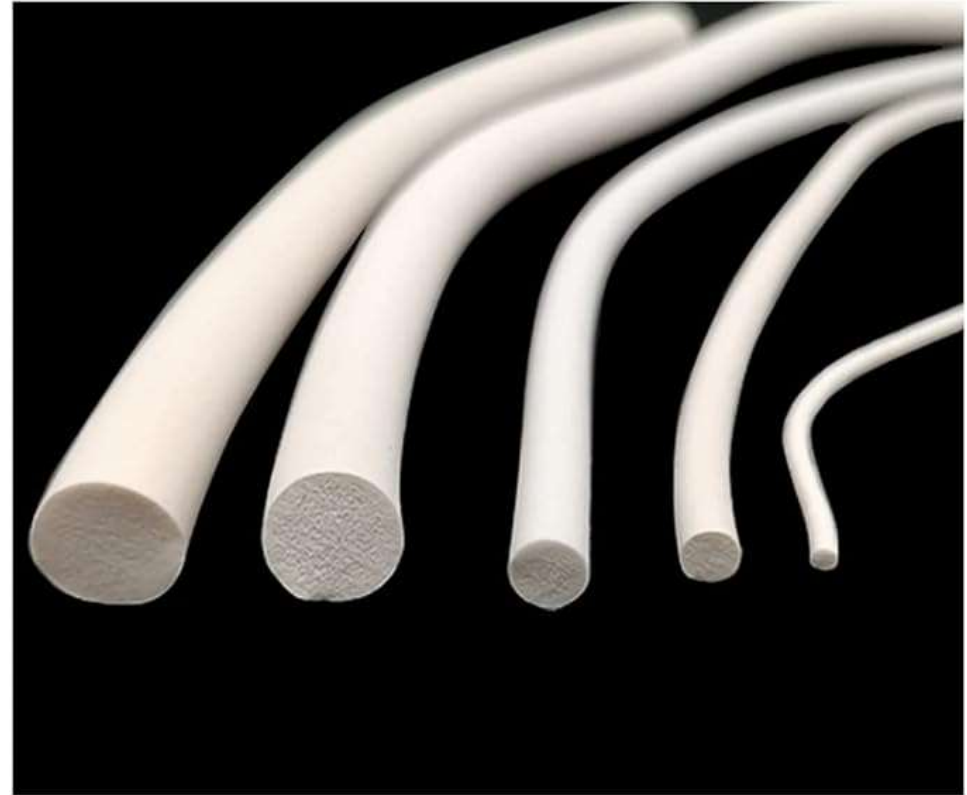
# Expandable Microspheres in Silicone Rubber

T e c h n i c a l   G u i d e

[www.expandablemicrosphere.com](http://www.expandablemicrosphere.com)

# Subjects

- Benefits of Applying Expandable Microspheres
- Expandable Microspheres grades to Choose
- Machine to Use
- RTV Silicones
- HTV Silicones
- Other Recommendations



## Waytop Microspheres

### Benefits

- Light weight / density reduction;
- Uniform and closed-cell structure;
- Compressibility
- Elasticity
- Low shrinkage
- Good flexibility
- Insulation





# Expandable Microspheres Grades To Choose

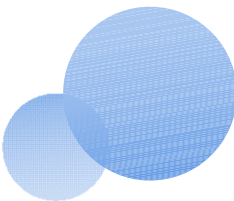
For **room** temperature vulcanizing silicone, we recommend the **expanded grades**:

Grade	Average Particle Size (µm)	Softening Temp (°C)	Density kg/m3
WP20W/D	20-30	110±5	30-40
WP40W/D	30-50	100±5	20-30
WP80W/D	70-90	120±5	15-25
WP100W/D	90-110	85±5	13-18



# Guidelines to Use Expanded Microspheres

- Expanded microspheres is a hollow light weight filler, which can reduce the weight of the silicon rubber by simply mixing.
- Dosage of expanded microspheres: 1-3%, depends on the initial viscosity of silicone, target of density reduction, tensile strength, etc.
- If the initial viscosity is low, you could dose more microspheres.
- 1 to 3% dosage of expanded microspheres will equal to 25-45% of the final product volume.





## Expandable Microspheres Grades to Choose

For **high** temperature vulcanizing silicone, we recommend the **unexpanded grades**:

Grade	Partical Size (D50,um)	Thermomechanical Analysis		Density(kg/m <sup>3</sup> )
		Tstart (°C)	Tmax (°C)	
WP140MD	9-15	95-105	135-145	≤20
WP140LD	15-25	95-105	135-145	≤20
WP175MD	10-18	125-135	170-180	≤17
WP175LD	18-25	125-135	170-180	≤15
WP190LD	25-35	145-155	185-195	≤20
WP200LD	18-25	145-155	190-200	≤20
WP200XLD	25-35	145-155	190-200	≤18



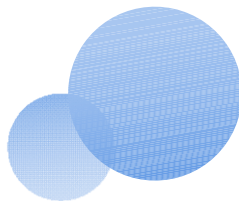
# Guidelines to Use Unexpanded Microspheres

Unexpanded microspheres will be required in the high temperature vulcanizing silicones, which need be mixed and heated to foam and vulcanize.

- The starting temperature of unexpanded microspheres need to match the curing temperature of the silicone.
- The expansion of microspheres should be before the curing of silicone. Microspheres can't expand well if the starting temperature for expansion is higher than the curing temp of silicone due to the strong crosslinking of the matrix.

The following curing agents are commonly used in silicones:

- **Dicumyl Peroxid:** cure the silicone at 100°C, recommend microspheres starting to expand at 80-100°C
- **Bis-(2.4-dichlorobensoyl) Peroxide:** cure the silicone at 165°C, recommend microspheres starting to expand at 120-160°C



## Waytop Microspheres

### Handling Machine of Expanded Microspheres

Since the extremely low density of the expanded microspheres, to avoid dusting, we need to use the **powder pumping equipment** when dosing the microspheres.





# Mixing Machine of Expandable Microspheres

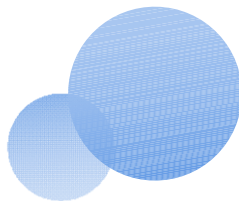
You will use a Banbury mixer, dough mixer or roll mills to mix solid silicones and unexpanded microspheres. To avoid any pre-expansion, the mixer should be equipped with a cooling system in order to keep the mixing temperature below 60°C.



Banbury Mixer



Roll Mills



## Other Recommendations

- Suitable processing for silicone rubber foaming: Compression molding and extrusion.
- To avoid pre-expansion, dose the microspheres at last during mixing, limit the mixing time.
- In a mold the added amount of rubber must be reduced to leave room enough for foaming.
- Dosage of microspheres: 1-3%, depends on the your target of density reduction.



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# Thank You!

If you want to learn more, please contact us.

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