

Typical Physical Properties

(Not for specification purposes.)



Property	3M™ Glass Bubbles
Shape	Hollow spheres with thin walls
Composition	Soda-lime-borosilicate glass
Color, unaided eye	Off-white, powdery
Crush strength (90% survival)	250–27,000 psi / 17–1860 bar
True density	0.125–0.60 g/cm ³
Median particle size	18–65 microns
Softening temperature	600°C (1112°F)
Thermal conductivity	0.05–0.20 W/m.K @ 20°C
Dielectric constant (@ 100 MHz)	1.2–1.9

3M glass bubbles are available in a wide range of grades with varying densities, crush strengths and particle diameters. Here are some general guidelines to get you started:



For polymer applications

For high-pressure applications or high-shear processes such as injection molding, consider our iM Series.

For general weight reduction applications that don't require high-shear processing, consider our K and S Series.

For a smoother surface finish, consider grades with a smaller particle size, such as iM16K, S60 or K42HS.

For applications requiring improved mechanical properties such as impact strength and stiffness, consider 3M glass bubbles with surface treatment.

For oil & gas applications

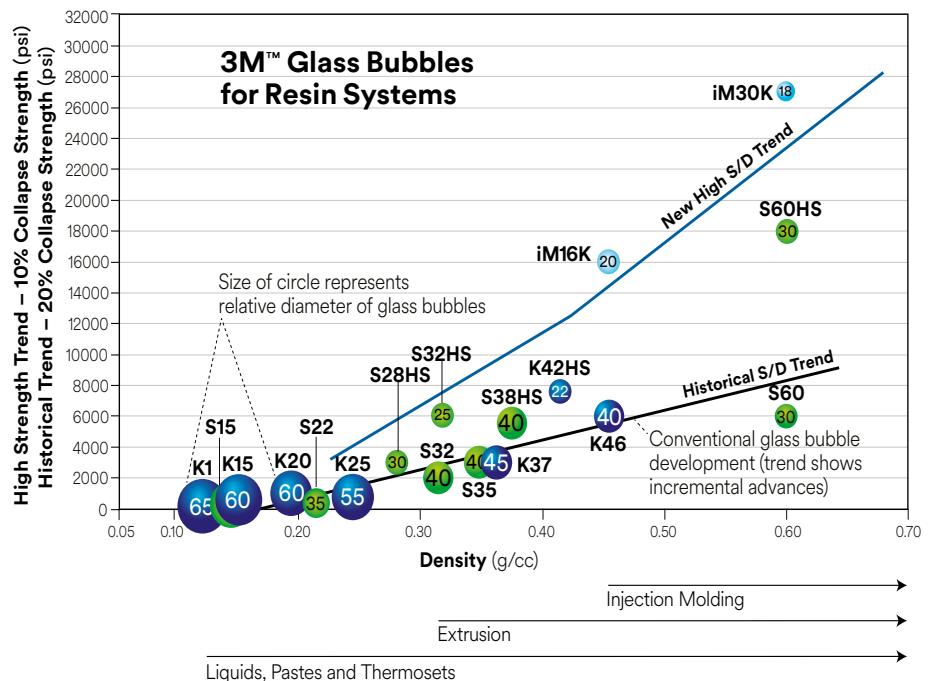
For drilling fluids and cements, consider our HGS Series.

For syntactic foams for thermal insulation and buoyancy, consider our S Series.

More than one option may be appropriate for your product or process. Contact your 3M technical representative for help selecting the optimal grade for your application.

Strength, density and size:

Find the right balance for your application.



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Grade	Crush Strength, psi bar		Minimum Fractional Survival, %	True Density, g/cm ³	Particle Size (50%), microns by volume*
3M™ Glass Bubbles - K, S, iM and XLD Series					
K1	250	17	80%	0.125	65
K11	200	14	80%	0.11	65
K15	300	21	80%	0.15	60
S15	300	21	85%	0.15	55
S22	400	28	80%	0.22	35
K20	500	34	80%	0.20	60
K20HS	750	52	90%	0.20	60
K25	750	52	80%	0.25	55
S32LD	1,500	103	80%	0.29	40
S32	2,000	140	80%	0.32	40
XLD3000	3,000	210	90%	0.23	30
S28HS	3,000	210	90%	0.28	30
S35	3,000	210	80%	0.35	40
K37	3,000	210	80%	0.37	45
S38	4,000	280	80%	0.38	40
S38HS	5,500	385	80%	0.38	40
S38XHS	5,500	385	90%	0.38	35
S32HS	6,000	420	90%	0.32	25
K46	6,000	420	80%	0.46	40
K42HS	7,500	520	90%	0.42	22
S42XHS	8,000	550	90%	0.42	22
S60	6,000	420	90%	0.60	30
iM16K	16,000	1,100	90%	0.46	20
S60HS	18,000	1,240	90%	0.60	30
iM30K	27,000	1,860	90%	0.60	18
3M™ Glass Bubbles - Floated Series					
A16/500	500	34	80%	0.16	60
A20/1000	1,000	69	80%	0.20	60
H20/1000	1,000	69	80%	0.20	60
D32/4500	4,500	310	80%	0.32	40
H50/10,000 EPX	10,000	690	90%	0.50	35
3M™ Glass Bubbles - HGS Series					
HGS2000	2,000	140	80%	0.32	40
HGS3000	3,000	210	80%	0.35	40
HGS4K28	4,000	280	80%	0.28	30
HGS4000	4,000	280	80%	0.38	40
HGS5000	5,500	385	80%	0.38	40
HGS6000	6,000	420	80%	0.46	40
HGS10000	6,000	420	90%	0.60	30
HGS8000X	8,000	550	90%	0.42	22
HGS18000	18,000	1240	90%	0.60	30
HGS19K46	19,000	1310	80%	0.46	20

*3M QCM 193.2