3M[™] Microspheres Selection Guide



3M[™] Microspheres offer a variety of inherent advantages over typical irregularly shaped mineral fillers. And 3M can offer engineered microspheres with different sizes, strengths, densities and compositions. Combining the inherent advantages with engineered features provides a wide choice of unique potential enhancements to help you meet specific processing and end-use requirements for many applications.

Selecting microspheres for performance

equipment and cost. Smaller spheres can help provide a smoother

Application Ideas	Potential Enhancements*	Product	Considerations	
Auto Body Repair Filler	Reduced pinholes, lightweight sanded surface	K1, K15, S15, S22		
Adhesives (Aerospace)	Weight reduction, reduced shrinkage,	K25	Low cost	
		S32, K37	When processing requires higher strength	
	high filler loading/reduced VOCs	A16/500, A20/1000, D32/4500	For high performance (ROV)	
Bowling Ball Cores	Density and the	K1	Low cost	
	Density control	K15, K20, S32, XLD 3000	When processing requires higher strength	
		A16/500, A20/1000, H20/1000, D32/4500	For high performance	
Buoyancy (Oil and Gas)	Cost reduction, weight reduction, water resistance, sandability/machinability	K1, K15	Shallow water flotation	
(Oli aliu Gas)	sandabiirty/machinabiirty	K20, K25, S32	Deep water flotation	
		XLD3000	When low density is required	
Cast Urethane	Cost reduction, sandability/machinability,	K1, K15	Low cost, low strength	
Gast Dietilalie	reduced warpage/shrinkage, weight reduction	K20	Commonly used	
Cryogenic Insulation (Bulk) Increased insulation, decreased compaction, annulus filler		K1		
	Reduced shrinkage	K1	Low cost	
Caulks		K15, K20	When processing requires higher strength	
		S15	Small particle size for smooth texture	
	Sandability/machinability, weight reduction, thermal shock resistance	S22	Small particle size for smooth texture	
Cultured Marble		K1	Low cost	
		K15, K20	When processing requires higher strength	
Furniture	Cost reduction, sandability/machinability,	K1	Low cost	
(Cast Polyester)	reduced warpage/shrinkage, weight reduction	K15, K20	When processing requires higher strength	
	Weight reduction, productivity improvements, resin displacement, improved dimensional stability	S38	Low cost	
Injection Molded/ Extruded Composites		K37, K42HS, K46, S60, S60HS, S38HS, S38XHS	When processing requires higher strength	
		iM30K, iM16K	When extrusion/molding requires very high strength	
Marine putties	Cost reduction, weight reduction, reduced	K1	Low cost	
	shrinkage/warpage	K15, K20	When processing requires higher strength	
Deep Sea Wet Pipe Insulation (Oil and Gas)		S38HS	High strength	
	High strength, low thermal conductivity	S38XHS	Extra high strength	
		XLD3000	Extra low density	

* Actual enhancements realized may vary depending on a variety of factors, some of which are uniquely within the user's knowledge and control. As a result, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.



Application Ideas	Potential Enhancements*	Product	Considerations
Paints (Architectural)	Improved scrubbability, burnish and stain resistance	W-210, W-410, W-610	White for easy color matching
Paints (Industrial & Maintenance)	Gloss control, burnish resistance, hardness, corrosion resistance, abrasion resistance, higher solids/reduced VOCs	W-210	Smallest particle size, least gloss reduction
		W-410	6 Hegman grind
		W-610	Maintenance paints
Plastic Components	Weight reduction, reduced shrinkage, improved throughput	K37, K42HS, K46, S38, S38HS, S38XHS, S60, S60HS, iM30K, iM16K	When optimized formulation is critical
Plywood Patch	Cost reduction, sandability, reduced shrinkage	K15, K20	Yields low density
Potting Compounds	Weight reduction, reduced shrinkage,	A16/500, A20/1000, H20/1000	For high performance
(Lightweight)	reduced dielectric constant, thermal insulation	K1	Low cost
		K15, K20	When processing requires higher strength
Potting Compounds (Regular Weight)	Reduced shrinkage, thermal stress crack resistance	W-610	Small particle size
Powder Coatings	Abrasion resistance, improved flow	W-210	Small particle size
rowuci coaunys	Abrasion resistance, improved now	W-410	6 Hegman grind
Rubber Components	Weight reduction, improved throughput	K42HS, S60, S60HS, iM30K, iM16K	When high strength, low density is required
SMC	Class A surface finish	S38, S60, S60HS, iM30K, iM16K	Small particle size for improved surface finish
Spackling	Sandability, reduced shrinkage	K1	Low cost, commonly used
Compounds		K15, K20	When processing requires higher strength
p		S15, S22	Small particle size for smooth texture
	Cost reduction, sandability/machinability, reduced warpage/shrinkage, weight reduction	K1	Low cost, not recommended for spray applications
Spray-Up/Lay-Up		K15	When processing requires higher strength, not recommended for spray applications
		K20	When processing requires higher strength, commonly used, not recommended for spray applications
		K25, S32, S35	Higher strength for spray applications
	Cost reduction, weight reduction	S32, S35	Low cost
Syntactic Foam (Oil and Gas)		A16, A20, H50, K37, S38, S38HS, S38XHS	For survivability at deep sea pressures
		XLD6000	When low density is required
Tape Joint Compounds	Reduced shrinkage, sandability	K1	Low cost
Tile Grout	Reduced shrinkage, improved flow	K20	Low cost
	הפטעטפט אוווואמשל, ווויףוטיפט ווטיי	K25	When processing requires higher strength
Tooling Board	Less dust during machining, sandability, machinability	K1, K15, S15, S22	Small particle size
Void Filler (Aerospace)	Lightweight	A16, A20, D32	Lightweight

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3M[™] Glass Bubbles Floated Series

	Target	True	Typical Particle Size (microns, by volume)			Color (unaided
	Crush Strength	Density	Distribution			
	(90% survival, psi)	(g/cc)	10th%	50th%	90th%	eye)
A16/500	500	0.16	25	55	90	green
G18	500	0.18	15	35	70	white
A20/1000	1000	0.20	25	50	85	green
H20/1000	1000	0.20	25	50	85	white
D32/4500	4500	0.32	15	35	60	green
H50/10,000 EPX	10,000*	0.50	15	35	60	white

*H50 strength per 3M QCM 90% survival minimum.

 $\ensuremath{\textbf{Note:}}$ Technical information and data shown here should be

considered representative or typical only and should not be used for specification purposes.

Refer to product data pages for additional technical information.



3M[™] Glass Bubbles Series

	Target	_	Typical Particle Size (microns, by volume)			
	Crush Strength	True Density	Distribution		Color (unaided	
	(90% survival, psi)	(g/cc)	10th%	50th%	90th%	eye)
K1	250	0.125	30	65	115	white
K15	300	0.15	30	60	105	white
S15	300	0.15	25	55	90	white
S22	400	0.22	20	35	65	white
K20	500	0.20	25	55	95	white
K25	750	0.25	25	55	90	white
S32	2000	0.32	20	40	70	white
S35	3000	0.35	10	40	75	white
K37	3000	0.37	20	45	80	white
XLD3000	3000	0.23	15	30	40	white
S38	4000	0.38	15	40	75	white
S38HS	5500	0.38	15	40	75	white
S38XHS	5500	0.38	15	40	70	white
K46	6000	0.46	15	40	70	white
K42HS	7,500	0.42	11	22	37	white
S60	10,000	0.60	15	30	55	white
S60HS	18,000	0.60	11	30	50	white
iM16K	16,000	0.46	12	20	30	white
iM30K	28,000	0.60	9	16	25	white

3M[™] Ceramic Microspheres

	<u> </u>		Typical Particle Size (microns, by volume)			
	Target Crush Strength	True Density	Distribution			Color
	(90% survival, psi)	(g/cc)	10th%	50th%	90th%	(unaided eye)
W-210	>60,000	2.4	N/A	N/A	13	white
W-410	>60,000	2.4	N/A	N/A	23	white
W-610	>60,000	2.4	N/A	N/A	38	white

Beyond microsphere enhancements... technical support and worldwide service

It can take more than quality products to help you solve complex problems. That's why 3M also provides technical support, a proven global service network, and ongoing R&D to help you meet your ever-evolving needs.

R&D... expanding our capabilities to serve you

With a focus on continuous improvement and innovation, 3M R&D takes you beyond our current microsphere technology – microencapsulation, surface treated products and metal coated products.

Resources

3M[™] Microspheres are supported by global sales, technical and customer service resources, with fully-staffed technical service laboratories and an authorized distributor network in the U.S., Europe, Japan, Latin America and Southeast Asia. Users benefit from 3M's broad technology base and continuing attention to product development, performance, safety and environmental issues – including development of innovative solutions such as surface-treated and metal-coated products.

For additional technical information on 3M microspheres in the United States, call 3M Advanced Materials Division, **800-367-8905**. For other 3M global offices, and information on additional 3M products, visit our website at: **www.3M.com/microspheres**.



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