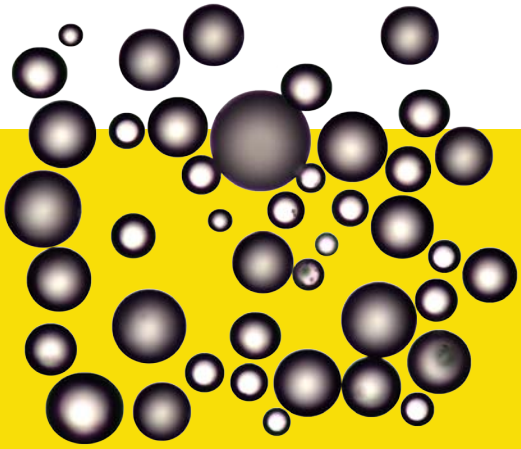
SEED PARTICLES FOR LDV AND PIV

MAXIMIZE THE PERFORMANCE OF YOUR MEASUREMENT SYSTEM WITH THE BEST CHOICE OF SEED PARTICLES.



The correct choice of seed particles is critical to the successful execution of PIV and LDV experiments. Thus, TSI offers a full range of seed particles to satisfy even the most difficult measurement requirements. Available seed particle materials include silicon carbide, nylon, polystyrene, titanium dioxide, and glass, to name a few.

Hollow particles are also available for improved density matching with the flow medium, as well as coated particles for maximizing the reflected light. Additionally, a range of fluorescent particles have been introduced for microPIV applications.

Seed particles should be small enough to follow the flow being measured, but large enough to generate a strong scattering signal. Standard particle sizes range from 1 micron to 12 microns, with other sizes available on request.

Seed Particle Selection

The source of PIV and LDV signals is a scattering particle, and the physical properties of that particle influence signal quality. Particle size, composition, density, shape, and concentration are important factors when selecting seed particles.

Features and Benefits

+ Fluorescent particles for microPIV experiments
+ Particles for high-temperature applications
+ Metallic coated particles
+ Wide range of particle sizes
+ Wide range of particle materials available
+ Both spherical and irregular particles

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SPECIFICATIONS

SEED PARTICLES FOR LDV AND PIV

The ability of a particle to follow fluctuations in the flow depends on the particle's aerodynamic diameter (da) which, in turn, depends on the particle's geometric diameter (dg) and density (ρ) according to the following equation:

$$da = dg \sqrt{\rho}$$

A smaller aerodynamic diameter is associated with a higher frequency response and a greater ability to follow rapid flow fluctuations. Relatively small particles, like the Model 900805 Dye Impregnated PSL and Model 10085A PSL, will thus be capable of following fluctuating flows. The 900805 particles incorporate a special dye and are especially suited for microPIV measurements. The 10085A PSL particles do not contain any dye additive and are suitable for general measurements in liquid flows. Model 10084 Nylon particles have a similar refractive index as the PSL but, due to their larger size, stronger signals will be generated. Settling of seed particles is always a concern in flow situations and the Model 10089 Hollow Glass Spheres are a good choice for flow situations where a large geometric particle diameter, but low aerohydrodynamic diameter, is required.

Maximizing the number of PIV vectors or LDV data rate requires the highest scattered light intensity from seed particles. This involves optimizing the particle surface properties and relative refractive index. Irregular particles, like the Model 10081 Silicon Carbide and Model 10086A Titanium Dioxide, generally scatter light well in all directions, and resist thermal breakdown. Thus, they are well suited for combustion and other high-temperature flows.

A greater relative index of refraction and larger geometric particle size both help improve signal strength. Metallic-coated particles (with significant real and imaginary refractive index components) generate good scattered light intensity and are preferred for water and other liquid flow applications. Thus, the Model 10087 Metallic Coated Spheres and Model 10089-SLVR Metallic Coated hollow Glass Spheres are well suited for seeding liquid flows for both LDV and PIV measurements.

Other factors to consider are achieving good particle pdispersion to obtain the desired number concentration, maintaining adequate particle lifetime in the flow, and particle toxicity/disposal concerns. Dispersion of solid particles in gaseous flows is accomplished typically by using devices such as the TSI Model 9306 Atomizer or the Model 3400A Fluidized Bed Aerosol Generator.

Contact TSI or your local representative if you need additional help in seeding particle selection for your flow.

Seed Particle Specifications

TSI Model	Particle Type	Nominal Mean Dia. (µm)	Size Range (µm)	Density (g/cc)	Refractive Index (real + imag.)	Quantity
900805	Dye-impregnated PSL	1.0	Std. dev. <0.05	1.05	-	10 ml*
10081	Silicon carbide	1.5	Std. dev. = 1.4	3.2	2.65	100 cc
10084	Nylon	4	Std. dev. = 1.5	1.14	1.53	400 cc
10085A	PSL	0.54	Std. dev. = 1.05	1.05	1.55 to 1.6	15 ml**
10086A	Titanium dioxide	3 to 5	-	4.2	2.6	0.45kg (1 lb)
10087	Metallic coated	9	4 to 12	2.6	0.21 + 2.62i	30 cc
10089	Hollow-glass spheres	8 to 12	10%<3 to 5 90%<14 to 17	1.05 to 1.15	1.5	1000 cc

Specifications are subject to change without notice.

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