INDCO fundamentals of dispersion •••

INDCO manufactures a variety of dispersion blades and disperser equipment designs. Some key concepts surrounding dispersion are important to understand before ordering your dispersion blade or disperser.

How Dispersion Works: Dispersion is a high-speed, high-shear process requiring more horsepower to successfully achieve than simple agitation for similar batch sizes. A deep vortex with visibility to the top surface of the blade is desirable. As the dispersion blade turns, particles contact the blade and are broken apart. In the intense turbulence surrounding the blade, particles collide at high speeds and are further broken apart. The area where these collisions occur, beginning at the blade's edge and extending out about two inches, is called the zone of attrition. Beyond the zone of attrition, the now-broken material is thoroughly mixed and particles are dissolved or dispersed by the horizontal laminar flow extending from the blade. The flow then divides into upward and downward components at the vessel wall ensuring complete circulation.

How To Get The Most From Your Dispersion: As a rule of thumb the blade diameter should measure 1/3 the diameter of the vessel. The optimum position of the blade is one blade diameter above the tank bottom. The maximum depth of the material should not exceed three times the diameter of the blade. The minimum depth above the blade should not be less than that below the blade. Round vessels almost always provide better dispersion than square vessels because they have no "dead areas" in the corners.

All blade designs generate similar shearing energy, which is the hydraulic tearing apart of particles. However, the Design C blades shear slightly less and generate less heat than the others due to the lower number of teeth per blade.

Shear is to a great extent determined by the tip speed (or rim velocity) of the blade; the faster the tip speed the higher the shear. Tip speed should generally be from 4,000-6,000 feet per minute. Research has shown that increasing speed beyond this range does not necessarily yield better results. The diameter of the blade will determine the RPM the shaft must turn to give the recommended tip speed. To calculate tip speed in feet per minute, multiply shaft RPM x .262 x blade diameter in inches.

How To Choose Your Blade Style: Blade selection is usually based on batch viscosity, desired process results and experimentation. INDCO offers 5 styles of blades. The Design A, B, C, and D blades will vary the most in their pumping action rather than their shearing ability.

A blade's pumping capacity refers to how well it moves material around the vessel or turns the batch over. Good pumping action is related to the size and the shape of the teeth. INDCO's Design A & E blades have the lowest pumping capacity due to their smaller tooth size. Design B, Design C, and Design D provide increasingly higher pumping capacity. The Design D blade features two different styles of aggressively sloped teeth resulting in higher pumping capacity.

Since higher pumping action is helpful for dispersion with viscous materials a Design C or D is recommended for these applications. Higher pumping capacity also consumes more horsepower, so caution should be used to avoid overloading the motor.

Blades with higher pumping capacities can introduce more air into the mixture than those designed for general dispersion. If low air entrapment is important, INDCO's Design A or Design E are recommended.

INDCO stocks the most common dispersion blade sizes in 304 stainless steel. Most sizes are available in 316 stainless steel with short lead times. INDCO's Designs A, B, C & D are also available with a tungsten carbide coating for extended life in high-wear applications.

INDCO can provide custom hole patterns to SAE or metric center hole sizes and add bolt holes or keyways to your dispersion blade order at no extra charge. Simply provide your specific pattern to our customer service representative when ordering.

Standard Hole Configurations and Mounting Options: Blades are provided with a single center hole standard per the following:

- 1" diameter blade has a 1/4" center hole
- 1 5/8" to 7" diameter blades have a 1/2" center hole
- 8" diameter and larger have a 5/8" center hole

INDCO also provides optional mounting hubs for dispersion blades. Mounting hubs allow for positioning dispersion blades on the mixing shaft with set screw(s). The welded-on model permanently attaches to a single blade. The bolt-on hub design can be reused with new blades. All mounting hubs are constructed of 316 stainless steel and can be customized to meet your bore or keyway needs.

Material of Construction: INDCO stocks the most common blade diameters in 304 stainless with other alloys available including 316SS and Hastelloy C-276. For increased blade life we offer tungsten carbide coating for designs A, B C & D. E style blades are generally not used in applications requiring coatings. For increased chemical resistance, Teflon® and Halar® coatings are available.

INDCO offers 5 varieties of dispersion blade designs from 1" to 36" in diameter.


Design A
- Performance match for the Cowles® blade
- Our most popular dispersion blade
- Used in manufacturing paint, clay slurries, paper, coatings, ink and more
- Rugged and efficient design
- Economical to use


Design B
- Performance match for Hockmeyer "F"
- Rectangular teeth, uniform size and height
- Popular all-around blade

Design C
- High-vane blade produces high pumping action
- Effective for heavy-bodied and/or heat-sensitive thixotropic materials

Design D
- Blade for high-vehicle viscosities and high-solids loadings
- Creates great turbulent flow with good shear and laminar flow
- Teeth vary in height and angles of attack
- Intermediate teeth set to assist flow feeding others
- Great blade dispersion with high pumping rate

Design E
- Has a knife style tooth extending out from the blade
- Unique blade style for maximum cutting
- Alternating vertical teeth ideal for cutting or shredding rubber, waxes, or other soft gummy materials