Shaft Stirring – Technical Information

Shaft Stirring

Laboratory overhead stirring is designed to mix substances by rotating a bladed shaft immersed in a liquid. Unlike magnetic stirrers, which require a magnetic stir bar placed inside the vessel, overhead stirrers use a shaft connected to a motor positioned above the vessel.

Overhead stirring is more powerful than magnetic stirring and is therefore often preferred when working with larger volumes or high viscosity liquids.

Shaft stirrers are available in various sizes, shapes, and materials, including glass, metal, and PTFE. Choosing the right specifications is crucial for your specific application. Cowie® shaft stirrers feature a moulded PTFE rotor fused directly to a PTFE shaft with an inner stainless steel core for added strength.

Advantages of PTFE shaft stirrers

- Manufactured from virgin grade PTFE conforming to FDA and USP Class VI.
- Chemical Resistance is virtually total.
- Extensive working temperature range, -200°C to 260°C (-328°F to 500°F).
- Stainless steel shaft core allows high speed stirring
- Easy to clean, robust and break resistant.
- Non-shedding, unlike magnetic stirring there is no contact between the stirrer and the container surface.

Shaft Stirrer Selection

The shaft itself is available in various lengths and diameter sizes. In general, the longer the shaft the bigger the diameter will need to be, this is to ensure the shaft does not vibrate/bend during use. The rotors come in various shapes and sizes and it is the rotor shape that will determine the flow pattern of the mixing.
Note: All Cowie® rotors are designed for clockwise rotation.

To ensure effective mixing, the following should be considered:

Viscosity More viscous liquids will require a larger diameter shaft, and often a bigger rotor.
Volume Larger vessels require longer shafts and bigger blades.
Speed Higher speeds require a more robust shaft to withstand the centrifugal forces.
Vessel For narrow neck vessels use a rotor with tiltable blades.
Baffles Required in larger vessels to prevent swirling and vortex formation.
Flow Type Rotor shape influences the flow type – axial, radial or tangential.

Flow Type	Flow Pattern	Flow v Shear Force	Applications	Example Rotors
Axial	Moves liquid in an up/down looping pattern that is parallel to the shaft	High Flow / Low Shear	Blending Homogenisation Suspending solid particles	Propellor Turbine
Radial	Forcefully moves liquid outwards away from the shaft	Low Flow / High Shear	Aggressive mixing Dispersion Emulsification	Centrifugal Flat blades
Tangential	Gently moves liquid in a swirling flow pattern around the vessel	Low Flow / Very Low Shear	Mixing thick viscous liquids	Paddle Anchor

Shaft Guides

A shaft guide is used when stirring to maintain optimal shaft positioning. The guide ensures a smoother and more controlled stirring action thus reducing vibrations and whip.

Customisation

As with all Cowie PTFE products we offer a complete custom manufacturing service for shaft stirrers.
Contact enquiries@cowie.com to discuss your bespoke requirements.