

# ANDERSON<sup>®</sup>

A Division of The Clark•Reliance Corporation

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## OPERATING AND APPLICATION PARAMETERS FOR ANDERSON BI INTERNAL PURIFIERS

### METHOD OF OPERATION:

The Anderson BI Internal Purifiers are standardized separation devices installed in separator drums. They cooperate with the drum vessel to remove liquid and solids from wet gas streams by performing a three-step, centrifugal separation process on the gas/condensate stream, which removes substantial amounts of entrained condensate, and drains it back to a lower liquid collection and return region, usually within the separator drum.

In the **first stage of separation**, Anderson BI Internal Purifiers operate very much like a top-load washing machine. As the drum spins in a top-loading washing machine, liquid is caused by centrifugal force to push its way through the perforated drum wall and exit, collecting along the wall of an outer chamber and falling down toward a drain region.

In the inlet of the Anderson BI Internal Purifier, stationary helical radial blades immediately guide incoming gas/condensate streams into a fast spinning motion. Unlike the washing machine example, Purifiers are used where minority amounts, up to 5% by volume, of liquid are traveling in a wet gas stream. These distributed, rain-like droplets of liquid and entrained solids, by Newton's First Law, want to travel in a straight—not curved—line. They collect on the inner cylindrical surface of the outer wall of the separator and drain by gravity downward on it. This completes the so-called first step of separation.

The **second stage of separation** occurs as the above-mentioned spiraling gas stream reaches the closed bottom of this spin chamber. Much like rolling a sock off of your leg, this downwardly spiraling gas stream—now having reduced liquid and solids content—is forced to fold inward and upward (which is in the direction of the outlet at the top center of the Purifier). This abrupt 180 degree turn causes additional droplets/solids to, by centrifugal action, exit the gas stream and collect with the gathering liquid at the bottom of the Purifier. The upward traveling inner stream is now further purified as this second step is completed.

The **third step of separation** occurs as this upward stream meets a vertical inner separator surface made of helical axial blades. When the upward stream passes through these it is again given a large spinning motion, the result of which again is separation of remaining droplets and particles—that travel in tangential straight lines to collect and drain down on the inner surfaces of these blades. This is roughly equivalent to the action of windblown rain hitting the side of a building. The wind continues to swirl around and move past the wall, but the vast majority of the liquid striking the wall will run down the side. This liquid also adds to the gathering liquid at the bottom of the Purifier, completing the last step of separation.

The resulting improved purity gas stream exits the top of the BI Purifier at the outlet, and the collected liquid/solids which have gathered in the bottom of the Purifier drain downward through the Eject Pipes into a lower collection pool of liquid in the vessel that contains the BI Internal Purifier.