

Hermetic Pump Operation

In hermetic pumps the ammonia circulates through the motor and around the rotor to wet the bearings and carry away motor heat. Depending on the make and model of pump, this liquid then either returns to the pump suction internally or exits the motor via an external pipe back to the suction side. The rotor and stator windings are separated by a very thin stainless steel or Hastelloy shell.

Since the bearings rely on liquid ammonia for lubrication, they cannot be allowed to run dry any time. Thus a differential pressure switch that will shut the pump off in case of loss of prime or severe cavitation must protect the pump. “minimum flow” orifices must also protect the pump. The minimum flow orifice prevents the pump running at too low a flow to cool and lubricate the motor and bearings. If this minimum flow is not provided, the motor and bearing heat will cause the ammonia inside the motor to flash, and again the bearings will run dry. The high flow orifice limits the maximum flow so that the NPSH available is not exceeded, otherwise the pump could lose prime or cavitate severely. In addition, if there is any grit or slag in the system, this too can circulate through the bearings and cause wear.

The end result of wear in the bearings is that if it is allowed to progress, the rotor will eventually become non-concentric with the stator and will begin to make contact with the very thin stainless steel or Hastelloy shell. At that point, it will quickly wear through the can and allow ammonia into the stator windings. In some models, the stator windings are encapsulated and the leads are hermetically sealed so that you may not have an immediate ammonia leak. There is the potential, though, of eventual shorting out in the stator windings.