

Motors and Drives in Chemical, Oil & Gas Industries

An air cooled heat exchanger, or ACHE, is a pressure vessel which cools a circulating fluid within finned tubes by forcing ambient air over the exterior of the tubes. In the oil and gas industry ACHEs are used in upstream and downstream applications as well as in midstream gas processing, to remove heat from the process.

The traditional drive for the heat exchanger fan is a vertically mounted AC motor, connected to the fan by a v-belt drive. Larger fans with higher horsepower requirements can be connected to a right angle gearbox. The fan shaft is supported by mounted bearings.

Baldor offers several Baldor•Reliance and Baldor•Dodge products designed specifically to add reliability and improve efficiency of the system. The API 661 motor is designed for this application. In addition to meeting the stringent requirements of IEEE841, these premium efficient motors include drain locations situated for vertical mounting, lifting provisions to make installation easier, and a shaft slinger over the non-contact, rotating labyrinth seal to ensure that moisture does not enter the motor during normal running or idle times. The drive end bracket is designed so that water runs off the motor and does not accumulate in pockets on the surface. The bearings are designed to handle the belt loads, and provide a minimum of 40,000 hours.

The Baldor•Dodge HT500 drive system provides a significant efficiency gain over standard v-belt drives. This synchronous drive system allows customers to obtain a minimum potential gain of 5% on efficiency. The drive system also reduces belt pull resulting in less stress on motor and

fan shafts. Maintenance is reduced and reliability improved with the elimination of belt tensioning. Because HT500 belts operate in wet, dusty, and oily environments and have the capability to handle higher temperatures than v-belts, they are well suited for use in air cooled heat exchangers.



Baldor•Dodge Grip Tight® ball bearings are perfectly suited for fan shafts. Gripping power is improved, and should a bearing be replaced, no damage to the shaft is created as is typical with set screw type bearings.

Another solution that Baldor offers is a direct drive motor with an adjustable speed drive. With this solution, the fan is mounted directly to the motor shaft, eliminating the belt drive (belts and sheaves) as well as the fan shaft and bearings. This increases reliability, reduces maintenance and improves efficiency.

This solution is possible because of several key technologies. The motors are designed and built with permanent magnet rotors. This construction allows for some efficiency gains, although the biggest advantage is the size and weight reduction this provides over standard induction motors. Because the motors are direct drive, they must be sized to run with base speeds that match the low fan speeds. The motors also take advantage of Baldor•Reliance RPM AC frame design, a leader in power density. This further reduces size and weight, making the direct drive design practical.

The motor is controlled by the ABB ACS880 drive. Specific for this application the drive has firmware that allows for easy set up and operation with motor parameters pre-loaded at the factory. With variable speed control, fans can be operated to optimize cooling to the process. A small reduction in fan speed provides a corresponding energy savings that is a cube of the speed. For example, running the fans at 90% speed will reduce energy consumption by 27%.

Some additional benefits to operating the Baldor•Reliance direct drive system include:

- Longer intervals between bearing lubrications
- Quieter operation
- Elimination of separate space heaters
- Ability to eliminate wind-milling
- Easy reversing for maintenance or de-icing
- 5 year standard warranty



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