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Split Flow inline vertical pumps: a new option

When process designs use API 610 centrifugal pumps for dual-service applications, use of the Split Flow feature provides unique benefits:

- Permits use of two pumps instead of four—capital savings
- Allows use of smaller motors—kW savings
- Provides better pump-to-system hydraulic fit, as defined by API criteria
- Results in longer mean-time-between-repairs (MTBR) for seals and bearings

The Split Flow principle (Fig. 1) is used with single-stage, overhung-type pumps (horizontal or vertical inline) up to 200 hp. "HP Innovations," January 1998, described two 60-hp, 3,600-rpm prototype units in commercial refinery fractionator reflux service since June 1996. Conventional pumps for this service would have used 125 hp motors. Use of the smaller motors results in an annual power cost saving of $26K for this installation. To date, no operating or maintenance problems have been reported for these prototype units.

For larger sizes, a similar Split Flow arrangement is used with multistage, between-bearings API-type pumps, e.g., two-stage radial-split case or multistage horizontal-split case models.

Horizontal-split case designs may be used for service temperatures below 400°F and specific gravities above 0.70, while radial-split, centerline-mounted API process pumps have been designed for temperatures as high as 800°F. In each instance, the Split Flow feature allows the economy of combining two separate pumps into one. This modification uses the same pump case, primary impeller and bearing bracket as standard pumps. Only the case cover and shaft are modified to incorporate the auxiliary impeller; the case cover seal chamber remains in compliance with API 682. An intermediate stage takeoff from the first impeller group is used when an opposed impeller design is selected.

Vertical inline version available. Just as in the horizontal models, vertical inline centrifugal process pumps incorporate a low-flow auxiliary impeller that receives inlet liquid from the primary impeller discharge. This Split Flow feature saves energy by significantly reducing brake horsepower when the pump is used for two process requirements, with one discharge flow stream at a higher head (up to twice) and lower flow (up to 30%) than the other. The pump separates the inlet flow into a primary high-flow, low-head discharge and a secondary lower-flow, higher-head discharge. The pump is effectively two pumps in one, i.e., the primary impeller is selected for the combined flow of both flow streams and the auxiliary impeller is selected for the flow and additional head of the secondary stream. The feature allows for use of smaller-diameter impellers. Impeller diameter can be a restraining parameter for some 3,600-rpm overhung pump services. The patented Split Flow feature is licensed to and available from various API pump manufacturers. ■

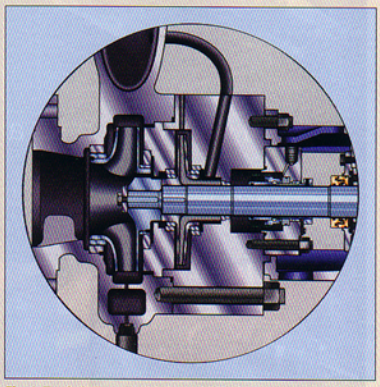

Fig. 1. The Split Flow principle is used with single-stage, overhung-type pumps.

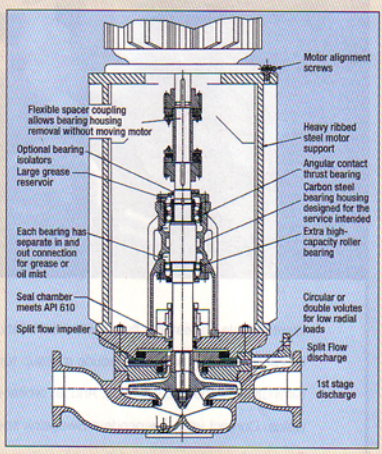

Fig. 2. Vertical inline centrifugal process pumps incorporate a low-flow auxiliary impeller.

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