

# DDHF Centrifugal Pumps

## Overview & Applications

Heavy duty refinery and petrochemical applications require heavy duty solutions. DDHF pumps are specifically designed to handle high pressures, elevated temperatures and fluids with low specific gravity, delivering exceptional performance in extreme environments where pressures could reach 500 bar and temperatures may hit 450°C. The design is based on the double casing BB5 pump design and complies with API 610. The design features include an internal volute casing and a back-to-back impeller configuration, simplifying maintenance, reducing downtime and guaranteeing pump reliability. These pumps are widely used in refinery and petrochemical applications such as hydrocracking processes, reactor feeds, ammonia and urea, as well as boiler feed service.

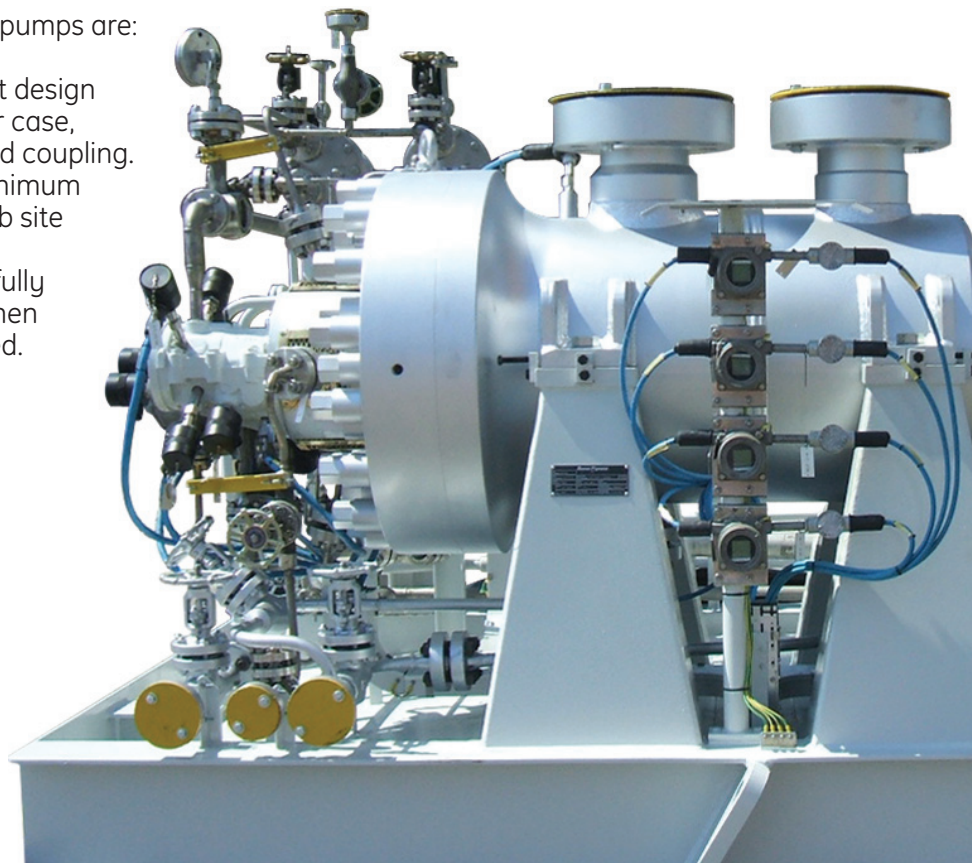
- 2) Impellers mounted back-to-back: This arrangement maintains axial balance without resorting to complicated balancing devices.
- 3) Double Volute: The double volute provides radial balance at all capacities and provides greater throat area, making the pump less subject to choking or build up.
- 4) Nozzle Location: The location of the nozzles is customizable for flexibility in positioning according to the application in question.

## Design Features

The outstanding design features of DDHF pumps are:

1) Simplicity of Maintenance:

- The optional hydraulic module pull out design permits complete removal of the inner case, covers, bearings, mechanical seals and coupling. This is an important feature where minimum down time is essential or where the job site environment is contaminated. A complete hydraulic module can be fully assembled in a clean workshop and then transported to the job site and installed.



## Outer barrel and cover

The outer barrel is a cylindrical body, either fabricated or forged, and designed for the required working pressure. To provide for uniform temperature expansion, the barrel is supported by four feet located on the horizontal center-line. To maintain alignment during expansion, a guide pin is located between the lower side of the barrel and the base at the coupling end. Movement away from the coupling is accomplished by means of a key and keyway located at the outboard end of the barrel. The cover is forged and designed for the required working pressure.

## Inner case

The inner case consists of two identical horizontally split halves designed with double volutes for radial balance. The horizontally split joint of the inner case is ground and lapped to provide sealing of the two halves without a gasket. Each inner case half is provided with two internal bleed-off lines from the high pressure stuffing box to suction pressure. Thus, both the high pressure and low pressure stuffing boxes are under suction pressure. The full discharge pressure surrounds the two inner case halves putting the two halves under compression, and thus only light inner case bolting is required for assembly purposes.

## Shaft

The shaft is made of heat treated alloy steel. The standard shaft extension is tapered. The advantage of the tapered shaft is ease of removal of the coupling when servicing a mechanical seal.

## Impellers

The impellers embody the latest developments in hydraulics and are opposed in order to provide axial balance over the entire operating range. The first stage impeller may be single suction or double suction

depending on the NPSH requirement.

Each impeller is keyed to the shaft and is assembled with a slight shrink fit. The keys are staggered 180° on the shaft.

## Wear rings, throttle and throat bushings

The impeller wear rings are mounted on the impeller with a slight shrink fit and are secured by pins. The case rings and throat bushings have tongues and are held in place by grooves in the case. A horizontal pin (inserted in the case ring and seated at the case split) prevents the rotation of the case rings, throttle bushing and throat bushings.

## Shaft sleeves

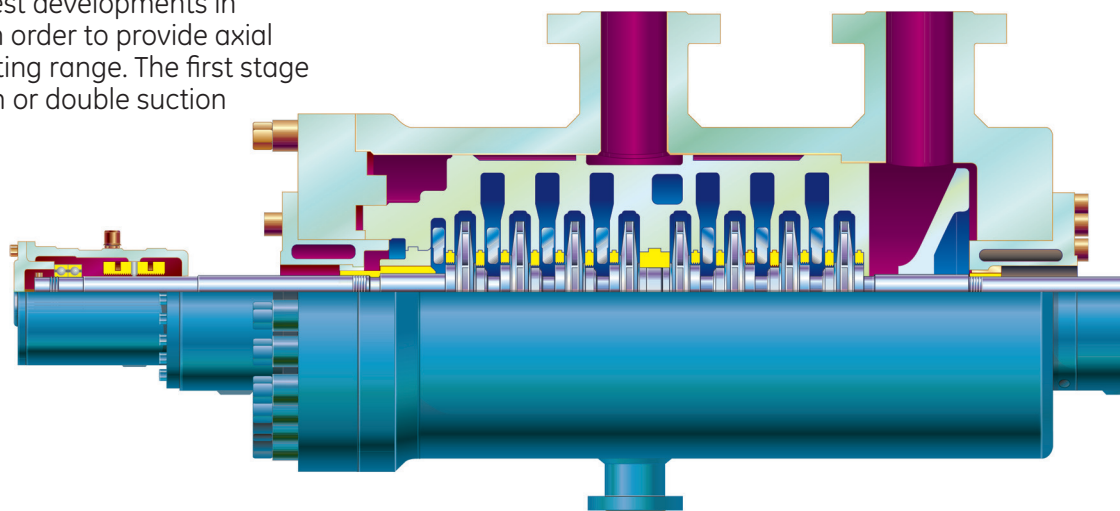
The shaft sleeves are threaded against rotation and locked against opposite rotation by a set screw located at the outer end of the sleeves and threaded into the shaft.

## Gaskets

Flexitallic type gaskets are provided between the cover and barrel, stuffing box and barrel, and stuffing box and cover, allowing metal-to-metal assembly of these parts.

## Stuffing box

The high and low pressure ends of the pumps are equipped with stuffing boxes. Cooling chambers, which can be mechanically cleaned, are available as an option. The stuffing boxes are equipped with four taps for gland studs.



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