



High Pressure, Solids-Tolerant Vertical Canned Motor Pump for Reactor Circulation

Chemical Facility Relies on Hayward Tyler's Chemical Slurry Pump Solution

The chemical facility in Louisiana is dedicated to the production of nitroalkanes and their derivatives. These chemical products are used as additives in coatings, pharmaceuticals, metalworking, water treatment, oil and gas, and other applications. The production of the specialty chemical IPHA requires a chemical reactor process that includes a circulation loop. This high pressure circulation process is a batch operation with 3-5 starts/stops per day. During normal operation the process fluid contains 1% or less of solids but in other situations content can reach 8%, such as a start sequence where solids may have accumulated.

After initially providing a canned motor retrofit to a competitor's existing pump, Hayward Tyler worked with the customer and a reputable mechanical seal manufacturer to develop a complete pump and motor solution for handling the troublesome process fluid.

To prevent the process fluid from entering the rotor chamber, the motor is isolated from the pumped fluid by a single mechanical seal. The system features an auxiliary pressurization, lubrication and cooling unit. The unit operates with demineralized water as its fluid medium to cool the motor and lubricate the bearings. The rotor chamber is pressurized to approximately 50 psig above the pump discharge pressure. By incorporating this feature, any seal leakage will be from the rotor chamber to the pump casing, thus preventing the process fluid from entering the motor.

Additionally, an expeller complete with pump-out vanes was included to keep solids from entering the mechanical seal cavity. The expeller and pump impeller were supplied in abrasion-resistant cast chromium iron material. Removable casing liners were also designed and supplied in the same material for increased protection of the pump casings.

After 20 years of reliable operation, Hayward Tyler replaced the firstgeneration units with new units of higher capacity to keep up with the facility's increased production. All of the same, successful product features were included in the most recent supply, as well as Hayward Tyler's latest condition monitoring system.

BASIC DESIGN DETAILS

- → Rated Flow: 1,800 gpm
- → Design Pressure: 1,200 psi
- → Design Temp: 300 °F
- → Rated Power: 60 hp
- → Power Supply: 460 V / 60 Hz / 3 ph
- \rightarrow Designed and manufactured in Colchester, VT, USA

Project Summary

SITE / LOCATION:

Louisiana, USA Nitroalkane-based Chemical Facility

SOLUTION AND FEATURES:

- → Single Stage Centrifugal Pump with Dry Stator Unit
- → Vertical design allows for a piping system supported installation (no baseplate required) and prevents gas entrainment that is otherwise possible in a horizontal design
- → Pump casing liners, impeller and expeller made of abrasion-resistant ASTM A532 Cl. 3 cast chromium iron
- → High pressure mechanical seal complete with pressurization, lubrication and cooling unit
- → Complete thrust disc assembly to take thrust in both directions and reliably handle significant transient conditions

Project Data Sheet

Product	Reactor Circulating Pump with Chemical Slurry	
Quantity	Two (2) Duty + One (1) Spare	
Codes and Standards		
Design	Commercial	
Test Standard (Hydro)	API 685 8.3.2	
Test Standard (Performance)	API 685 8.3.3	
Test Standard (Vibration)	API 610, Table 7	
Flange Standard	ANSI B16.5	
Materials Standard	ASME / ASTM	
Electrical Standard	IEEE 252 / NEMA MG1	
Nozzle Loading	2 x API 610	
Pump Details		
Ритр Туре	Centrifugal, Single Suction, Single Discharge	
Pump Size	8" Suction x 8" Discharge with 11" Impeller	
Fluid Pumped	Nickel Catalyst Slurry (IPHA Production)	
Solids Content	8%	
Operating Temperature	160º F	72º C
Rated Flow	1800 gpm	410 m3/hr
Specific Gravity	1.16 (max.)	
Rated Head (FT)	60 ft	18 m
Design Pressure (psig)	1200 psig	83 bar
Design Temperature (oF)	300° F	149º C
Hydrostatic Test Pressure (psig)	1800 psig	124 bar
Motor Details		
Motor Rating	60 HP	40 kW
Service Factor	1.15	
RPM	1750	
Power Supply	460 V / 3 ph / 60 Hz	
Motor Full Load Current	100.6 Amps	
Weights (Approximate dry)		
Pump Casing & Liner	2436 lbs	1105 kg
Back Cover & Liner	1133 lbs	514 kg
Motor, Impeller & Expeller	1835 lbs	832 kg
Total	5404 lbs	2451 kg
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Solids tolerant, chemical reactor circulating pumps installed in chemical plant in Louisiana

Removable upper and lower pump case liner made from hard, abrasion-resistant material for solids protection

Impellers and removable wear rings selected in hard, erosion- and corrosionresistant materials with heat treatment, as needed

Expeller with pump-out vanes to prevent solids from entering the seal cavity

High pressure mechanical seal within the canned design for prevention of the process fluid (including solids) from entering the motor

> Stiff journal bearing installed on a large diameter rotor shaft minimizes shaft deflection at mechanical seal faces and improves service life

Comprehensive thrust bearing designed for the application to accommodate a wide range of hydraulic loads, as needed



Engineered solutions for the global energy sector

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