

## VEY molten salt pump for concentrated solar power



# Main industries and applications

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The VEY is a vertical mixed flow pump with high capacity and medium to high head. Its design includes hydraulics from proven ranges. This pump has been engineered to balance high efficiency, low submergence and Net Positive Suction Head Required (NPSHr) considerations.

The VEY is used as:

- Cold and hot molten salt circulation pumps in parabolic trough Concentrated Solar Power (CSP)
- High pressure cold molten salt feed pumps in central tower CSP
- Hot molten salt circulation pumps in central tower CSP
- Cold molten salt attemperation pumps in central tower CSP
- Cold molten salt melting and drainage pumps in parabolic trough and central tower CSP

## Molten salts extending the operation period

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Molten salts are increasingly used today in CSP plants for heat storage or as primary Heat Transfer Fluid (HTF) due to their high specific heat capacity. When a thermal storage reservoir using molten salts is integrated into a CSP plant, electricity can be generated even after the sun goes down, with an extended operation period of up to 6-15 hours.

Vertical pumps mounted in tanks are preferred nowadays to simplify the molten salt system. This eliminates the pump sumps, isolating valves, level instrumentation and associated heaters. It also reduces heat losses and allows the system to drain directly into the tanks.



# Features and benefits

## 1 Engineered suction design for optimized submergence

## 2 First stage impeller

- Inducer or high Suction Specific Speed (Nss) impeller for reduced NPSHr

## 3 Engineered bearing bushings

- Better shaft alignment and adaptation to the thermal expansion

## 4 Main shaft sealing by throttle bushing

- Permanent leak-off recirculation to the molten salt tank

## 5 Auxiliary shaft sealing deflector

- Prevents leakage of molten salt to the atmosphere

## 6 Efficient thermal barrier

- Heat barrier between hot/cold sections

## 7 Muff coupling to ease dismantling

## 8 Special design to allow thermal expansions

- Extended wear ring zone
- Clearances calculated considering all the relative expansions

## Engineered to your needs

Thermal distortion Finite Element Analysis (FEA) at steady state and stand-by conditions are performed.

Structural modal natural frequency FEA are completed in order to identify / avoid structural resonance conditions at all the running speeds.

Lateral and torsional rotor-dynamic analysis are carried out to ensure safe behavior throughout the complete speed range.



# Design features

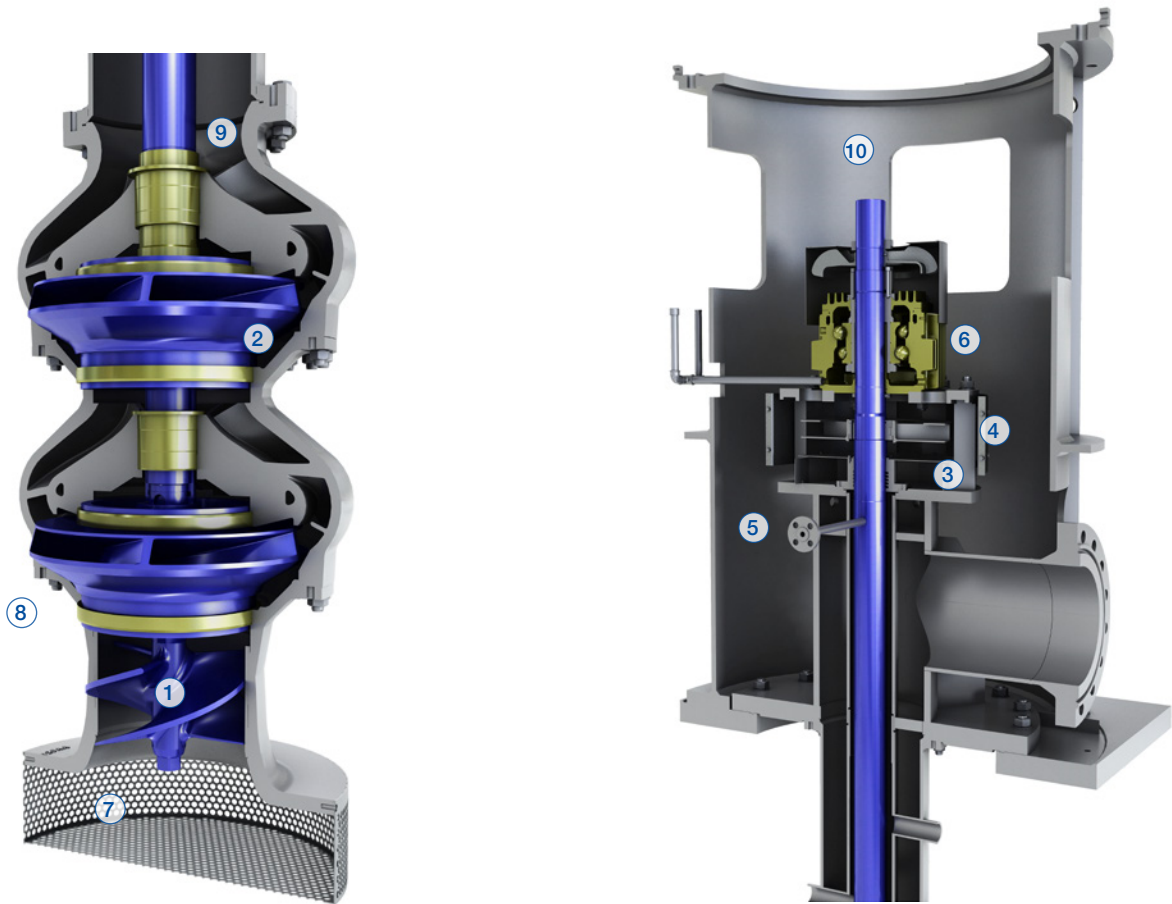
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## Design standards

- 1 Suction inducer for very low NPSHr
- 2 All the impellers and bowls are provided with draining holes
- 3 Efficient heat shield to limit the heat loss
- 4 Shaft fans/radiators to reduce temperature, protect and increase lifetime of the pump bearings
- 5 Nitrogen/air quench connection to allow tank blanketing
- 6 Thrust bearing located in the pump

## Design options

- 7 Wide mesh suction strainer
- 8 High Nss mixed flow first stage impeller for reduced NPSHr
- 9 Interchangeable sleeves under the line shaft bearings
- 10 Thrust bearing located in the motor



# Specifications

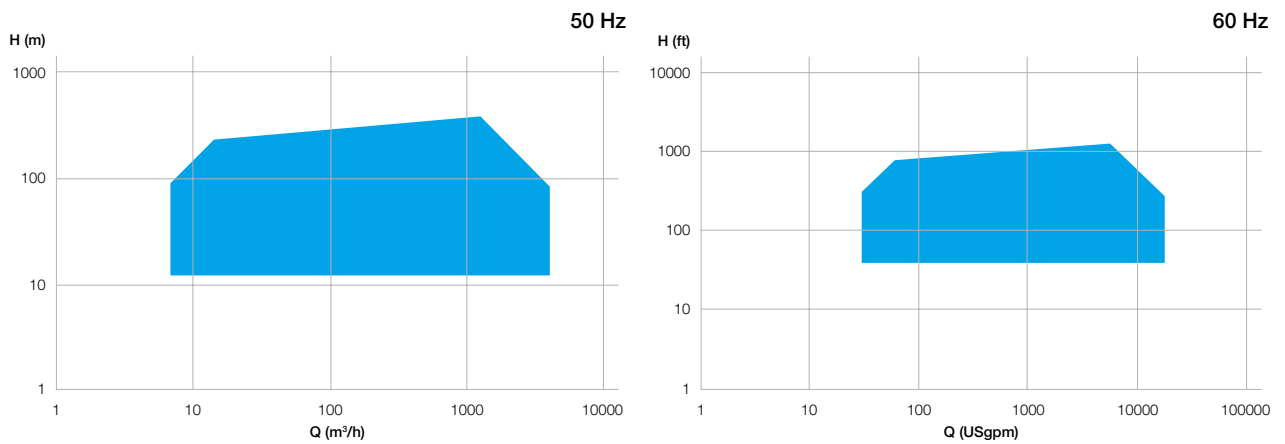
## Materials

Pump part	Material
Bowl	HT carbon steel, chrome steel, HT stainless steel
Impeller	HT carbon steel, chrome steel, HT stainless steel
Shaft	HT chrome steel, HT stainless steel
Column and discharge head	HT carbon steel, HT stainless steel

## Operating data

	50 Hz	60 Hz
Bowl sizes	up to 914 mm	up to 36 in.
Capacities	up to 4'000 m <sup>3</sup> /h	up to 17'600 USgpm
Heads	up to 380 m	up to 1'250 ft.
Pressures	up to 100 bar	up to 1'450 psi
Temperatures	up to 600°C	up to 1'100°F

## Performance range



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