

CONCENTRATING SOLAR POWER - MOLTEN SALT APPLICATIONS

USING SERIES 30,000 'MOLTEN SALT' CONFIGURATION



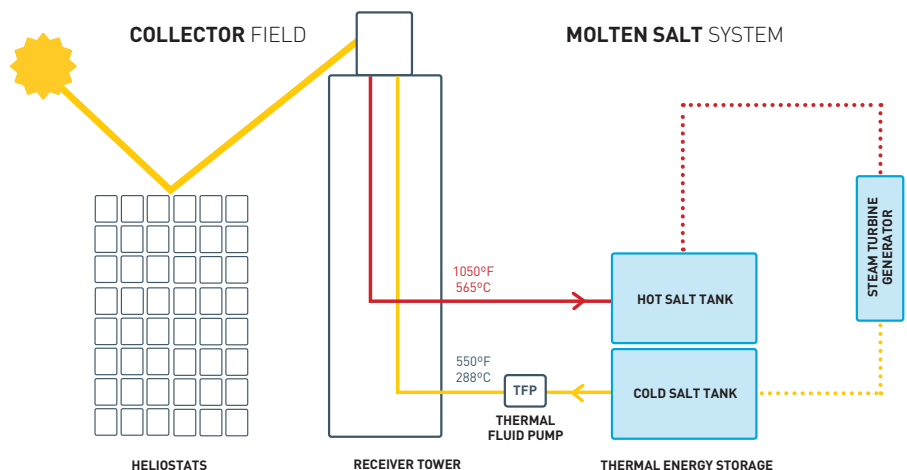
As one of the most innovative methods for storing solar energy, molten salt thermal energy storage and heat transfer has become an integral part of electricity generation worldwide. Over the years, Emerson Vanessa has been approached by some of the major companies operating in this industry to design a triple offset valve solution capable of fulfilling their needs: The Vanessa Series 30,000 'molten salt' valve is the successful result of such development. Its butt-weld body style features an extremely compact design that fully integrates with the pipeline and, following the same heating principle as the welded pipe, significantly reduces thermal dissipation simplifying the piping insulation design. In fact, Vanessa Series 30,000 'molten salt' configuration is three times more efficient in retaining heat at 600°C (1112°F) than a comparable globe valve. This also translates into a significant reduction in energy demand in cold conditions.

The key advantages in adopting Vanessa Series 30,000:

- Molten salt solidification is prevented by eliminating inner cavities
- Minimized number of external leak paths and lower need for dedicated insulation
- Dedicated valve design and bill of materials to handle extreme service temperatures
- Available in both cast and forged bodies depending on customer's specification

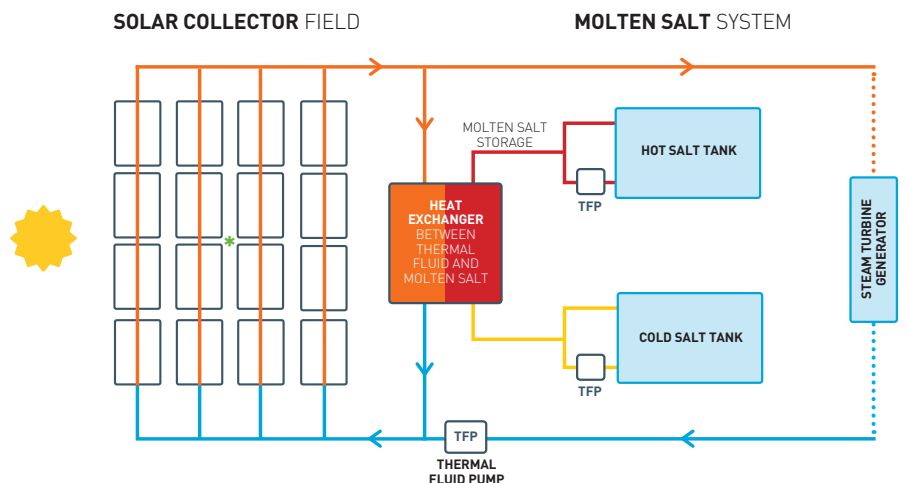
CENTRAL RECEIVER SYSTEM

On central power systems, Series 30,000 handles isolation and control of the receiver tower for both hot and cold molten salt. In particular, Vanessa valves isolate molten salt tanks and heat exchangers, pumps and main tower piping. Smaller sized valves (minimum NPS 3) are used for molten salt drain and pipe vent. Control is provided for pump start ups and overall molten salt flow controls across the entire system.



PARABOLIC TROUGH TECHNOLOGY

With parabolic trough technology, our valves manage similar molten salt applications at lower temperatures (400°C) with carbon steel material. In addition, molten salt valves can be used to isolate the piping system within the solar field as well. For hot oil/steam application standard valves please refer to Series 30,000 basic configuration brochure.



*NEW Technology development

Molten salt can be used for solar fields as well

VANESSA SERIES 30,000 TRIPLE OFFSET VALVES

PRODUCT INFORMATION

WHAT IS A TRIPLE OFFSET VALVE (TOV)?

The Vanessa Series 30,000 TOV shares the same cone-to-cone principle as with a globe valve, but sealing is performed by quarter turn rotation. Its optimized seating angles and rotational characteristics guarantee superior zero leakage tightness* via an ingenious combination of the triple offset design and a flexible metal seal ring.

* Zero Leakage means no visible leakage when tested at high pressure with water and low pressure with air according to existing international standards.



THE VANESSA TRIPLE OFFSET BENEFITS

Reinforced external leakage barriers

A globe valve usually features multiple potential external leakage paths, including the packing box and the bonnet-to-body connection.

In a Series 30,000 'molten salt' valve, such risk is restricted to the packing box only. Its design, in turn, has been heavily modified to overcome the specific challenges of molten salt.

Because graphite tends to oxidize and is sensitive to accidental overheating by the heat tracing, Thermiculite® has been adopted instead. Kalrez® O-rings and a live load packing device have also been added to provide extra barriers, ultimately resulting in an extremely reliable solution.

Compact design

The triple offset sealing technology enables us to manufacture a valve with an extremely compact design that fully integrates with the pipeline. A single sealing plane which is perpendicular to the pipe axis ensures no negative impact by pipe stresses. In comparison to globe valves, Vanessa TOVs have a significantly lower footprint and are easier to insulate.

Minimal Heat Consumption

Buttwelded to the pipe, our valve minimizes any heat loss and reduces the quantity of power-induced heating to keep molten salt in a liquid state during the cold process. The Vanessa Series 30,000 'molten salt' valve features a strategically fit packing (closer to the valve core) which limits the need for heat tracing to a small area of the bonnet. Maintenance of the packing can easily be carried out thanks to a special shaft design. Heat provided to the adjacent piping is enough to keep the valve body to the required temperature - i.e. there is no need for a dedicated heat tracing circuit.

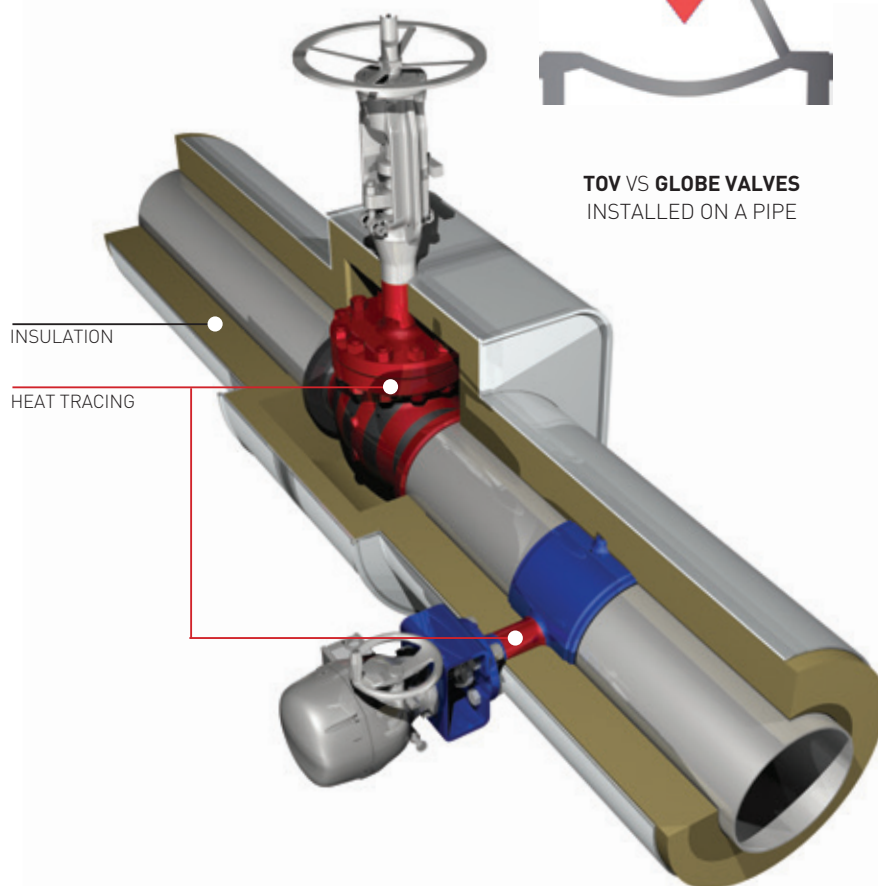
No bolted connections

Vanessa's compact design is free of flanges or bolts ensuring long valve life and minimum maintenance. To overcome the challenges derived from molten salt corrosiveness and permeability, the valve-to-pipe connection of Series 30,000 has been completely integrated by using a butt-welded body.

STANDARD TOV VS GLOBE CONE TO CONE PRINCIPLE



TOV VS GLOBE VALVES INSTALLED ON A PIPE



To learn more, please visit: WWW.VANESSAVALVES.IT