James Walker & Co Ltd
Gote Brow
Cockermouth
Cumbria
CA13 0NH
United Kingdom

Tel: +44 (0) 1900 823555
Fax: +44 (0) 1900 898354

www.jameswalker.co.uk

Registered Office: Lion House Woking Surrey GU22 8AP UK
Reg. No. 2432592 England

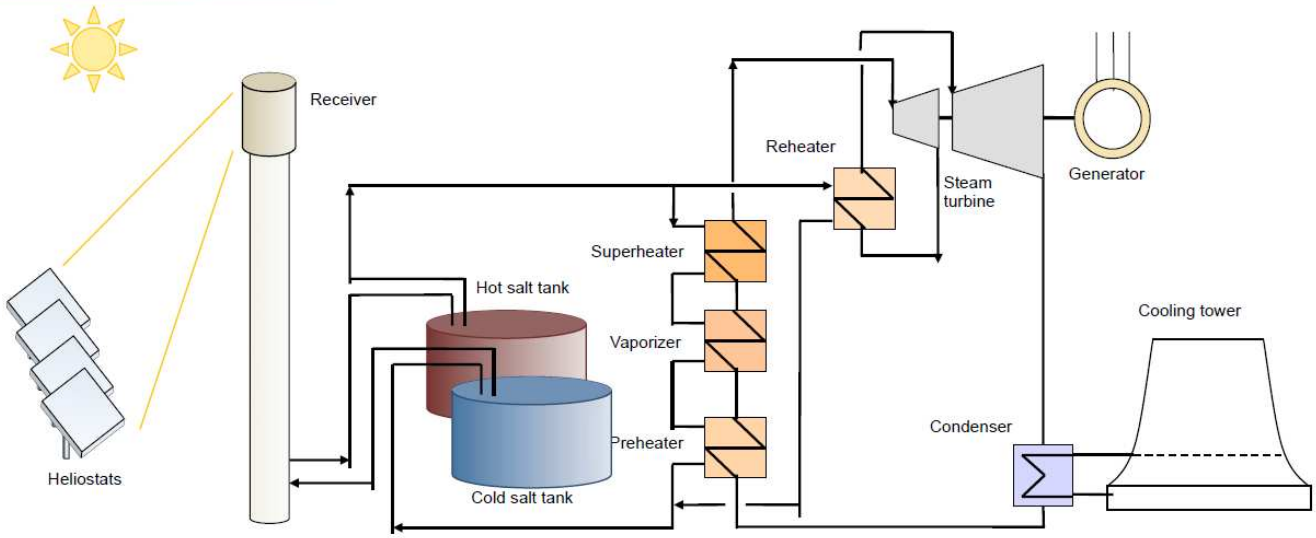
James Walker – MICA & High Strength Carbon combination set – Product Offering for Solar Power industry – for sealing of molten salt systems

31/05/17 – M. Coulthard

Overview

The processes within the solar power industry are driven by the efficiency of the media and their ability to retain heat through the process, for maximum output of steam/ power generated. As part of the process of improved heat efficiency media technology has developed to the use of molten salts at elevated temperatures, which are notably corrosive, oxidising and abrasive. The ability to seal these salts; with respect to service life and minimised down time; is a significant factor that contributes to overall process efficiency.

Historically graphite has been used in valve sealing arrangements with some levels of success; but, as temperatures are ever increasing the market demands are for more advanced/ superior sealing options for high temperature.



Range of media and temperature of relevance. Operating temperatures of the technologies using synthetic oil as heat transfer fluid (HTF) are limited to 400℃. Molten salt, usually a mixture of nitrate salts, is used in concentrated solar thermal systems because it is a liquid at atmospheric pressure. The operating temperatures are similar with usual steam turbines and it is non-flammable and non-toxic. The typical composition of the molten salts is 60% by weight of Sodium Nitrate ($NaNO_3$) and 40% by weight of Potassium Nitrate (KNO_3). The melting point is of the nitrate salts of 221℃. Currently the operating temperatures are up to 600℃. Latter process steps have pressurised steam or air as working medium at very high temperatures.

James Walker

(continued)

Product Offering

James Walker have a comprehensive range of product offerings from compression packings and gaskets to elastomer sealing solutions; to cater for the Solar Power industry market needs.

As part of this product range, James Walker has developed a combination packing & MICA product solution; this product offering combines the high temperature properties of mica, with the low friction and abrasion resistance of carbon fibre.

The James Walker Lionpak® 5301 is braided packing length manufactured from high strength continuous filament carbon yarns, which offers;

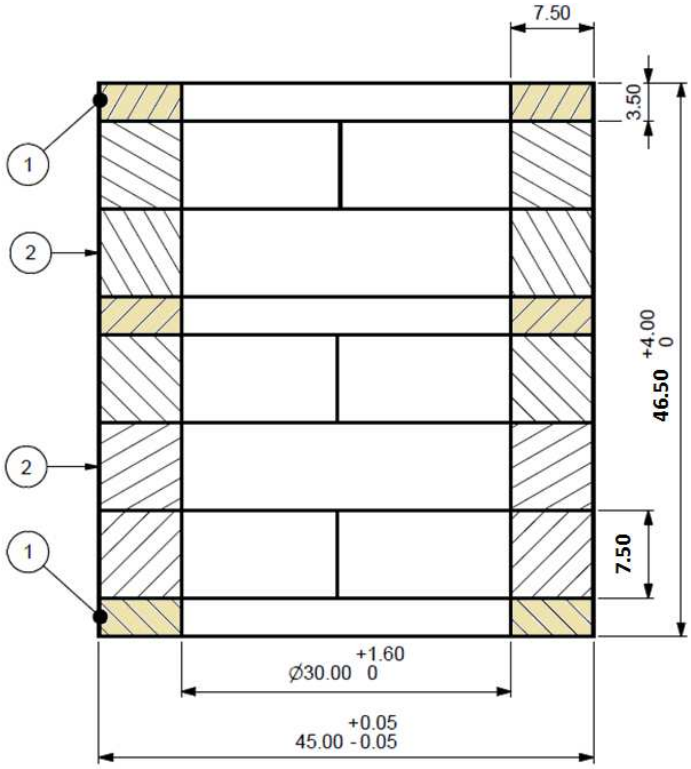
- A high thermal conductivity,
- advanced oxidation resistance
- Advanced strength, which ensures resilience to abrasive nature applications.
- Product Information - https://www.jameswalker.biz/en/pdf_docs/345-lionpak-5301

The temperature capabilities of the Lionpak® 5301 are then boosted through the use of precision machined Phlogopite mica laminate rings (3mm thick); inserted at the top and bottom of the stuffing box set as well as intermediary rings. The MICA is designed for electromechanical and thermo-mechanical applications requiring one or more of the following properties;

- excellent resistance to heat and even to open flame up to 1000°C,
- low thermal conductivity,
- excellent electrical insulation,
- high resistance to pressure,
- impervious to most chemicals, in particular oil and grease,
- asbestos free and ecologically safe and non-toxic;
- The mica is de-smoked for improved dimensional stability at high temperatures.
- <1% water abortion @ 23°C (over 24Hrs) and more notably <6% water absorption over 4Hrs at 600°C.

In combination as per the following arrangement;

- MICA Rings – oxidation and thermal barriers at the top, middle and base of packing set.
- Lionpak® 5301 RING SET PAIRS. For heat dissipation, and continued sealing performance through mechanical stem cycles.



Other Contributing Factors to Performance

- Use of live load washer system
- Extended valve bonnet from media heat source
- Use of metal bellows
- Stem surface roughness/ hardness
- Dynamic movement, rotary reciprocating or ¼ turn and respective stroke length and frequency
- Fitting procedure
- Valve housing design.
- Application temperature, pressure. (Media)