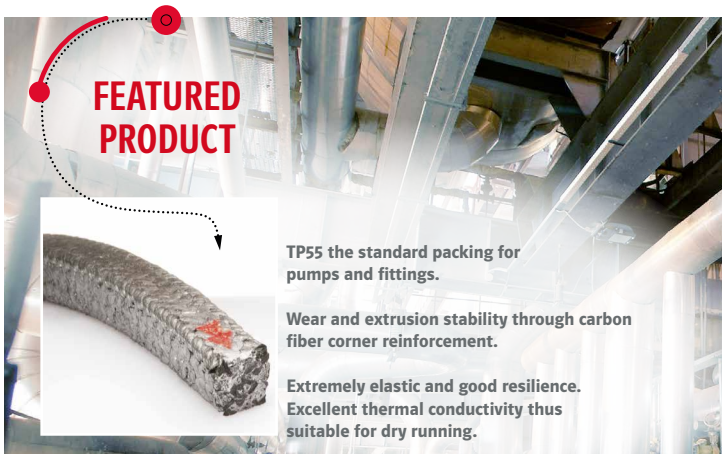
ProPack
DICHTUNGEN UND PACKUNGEN AG

YOUR COMPETENT PARTNER
WORLDWIDE IN
SEALING TECHNOLOGY

NEWSLETTER 06-23



Trapez-Pack®55 Grapho Carbo

Braided from Carbon fiber and carbon reinforced expanded Graphite Tape

- Non hardening, good reset capability, coefficient of thermal expansion corresponds to the coefficient of steel
- High temperature resistance and excellent heat and electric conductivity
- Self-lubricating, excellent use in pumps, minimizing the need of flush water
- Easy to cut, assemble and disassemble
- Low coefficient of friction minimizes the adjustment force in valves

QUESTIONS & ANSWERS ABOUT GLAND PACKING

QUESTION: HOW TO INCREASE THE SERVICE LIFE OF A PUMP PACKING WHEN IT IS SEALING AGAINST SHAFTS WITH LOW SURFACE HARDNESS?

A survey showed that most shaft sleeves are made of stainless steel. There are various grades, but most do not reach a surface hardness of HRC 25. For some packing this is sufficient, but for most packing a much higher value is recommended e.g., for aramid packing HRC 60. This can only be achieved by suitable surface treatment or coating. a worn shaft or sleeve makes it difficult or impossible to readjust the packing to compensate for abrasion or volume loss and to restore the desired leakage.
In addition to a suitable shaft surface hardness, there are 2 other ways to achieve better service life. a trapezoidal braid, installed with the narrow side facing the shaft, reduces radial load and with the wider side pressing against the stuffing box bore increases sealability. This effect reduces the required axial force that must be applied to the packing to produce an effective sealing action and, as a result, shaft wear is also reduced. The second way is to create a hybrid packing made of a hard and a soft, thermally conductive yarn in a W-wave braid pattern. This creates a packing that resists abrasive particles in the sealed product and leaves a softer footprint on the shaft. The result is less hardening and a reduced wear rate.

QUESTION: WHAT IS THE PURPOSE OF RUN-IN LUBRICANT IN A PUMP PACKING?

Run-in lubricants in packing are often attributed miraculous properties in brochures. Basically, silicone oil, paraffinic oil and rarely synthetic oils are used. Volume content of 15 – 25 % can be found. The task of the oil is to support the pliability of the braid during installation. During compression, the force applied axially is to be converted radially into sealing force on the shaft and the stuffing box bore. This is referred to as K-value, which in some types of packing exceeds 90 %.
The second effect is to protect the packing from overheating during pump start-up. The oil becomes thinner due to the generated frictional heat and exits the packing together with the leakage. As a result, the volume of packing in the stuffing box decreases, the tension decreases, and the packing survives the start-up process. When this is complete, a small amount of oil remains in the packing, which maintains the flexibility of the braid and thus allows readjustment. When this portion is also used up, the packing will harden and no longer provide sufficient sealing capacity, even when large gland forces are applied.

QUESTION: SHOULD YOU USE VALVE PACKING RINGS MADE OF BRAIDED PTFE YARN OR EXPANDED GRAPHITE?

Besides PTFE's natural service limit of 280 °C / 535 °F, these two, most commonly used, packing types can be compared to each other by their properties. PTFE packing is manufactured as a braid and is often used as a ring with a skive cut. However, endless varieties are also available for OEM. The yarn has quite some heat shrinkage which is also transferred to the braid. This causes the packing around the stem to contract and increased leakage occurs along the stuffing box bore. PTFE also has a coefficient of thermal expansion 11 times higher than the valve materials. This causes extrusion during heat up between the gland and the stem. As a result, the sealing result suffers. The packing must be readjusted, which leads to higher compression and results in an extremely hard braid that can after a while no longer be adjusted.
On the positive side, PTFE is resistant to almost all chemicals and has one of the highest sealing capacities among valve packing, which is extremely advantageous in terms of reduced emissions. Expanded graphite rings are produced by simply winding a graphite tape up to a spiral and compress it axially in a die. The rings are normally always endless and therefore can only be used by disassembling the valve. The tape is only 0.38 mm/0,015" thick which can cause shearing of the first layers and extrusion. Expanded graphite can be used in steam up to 550 °C / 1020 °F and is resistant to most chemicals. Due to its layered construction and porous material, it is not possible to achieve a reasonable emission limit even at extreme compression up to 70 N / mm^2 / 10000 lbf / in^2 without aids such as PTFE coating.
Combining both materials into a yarn which is reinforced with an ultra-thin Inconel matrix and braid it into a packing proves to be extremely helpful. Installation of a packing made of this hybrid material is simplified without disassembling the valve by using rings with a skive cut, and extrusion and blowout resistance is provided by the applied reinforcement. The packing remains permanently flexible due to the expanded graphite content and is adjustable with low gland forces. As a result, it meets most emission limits.