



# Preformed Packing Rings Outperform Field-Cut Parts

By FSA member Alfred Cooper

One of the oldest sealing devices, compression packing is still very common in modern industries such as oil and gas, petrochemical, agriculture, pulp and paper, power generation, and mining. Compression packing is made from a range of soft and pliable fibrous yarn materials—from vegetable and animal fiber to many high-performance synthetic fibers. Most compression packing is formed by braiding fibrous materials such as carbon, polytetrafluoroethylene (PTFE), graphite, aramid and acrylic yarns. Each braid structure—round, square or braid over braid—is unique and intended for specific performance.

Braided packing works best in rotating, reciprocating or static applications. Square-braided packing fits well with pumps and valves in low-pressure operations. For higher pressures, braid-over-braid constructions are more appropriate, especially in valve stems and expansion joints. More advanced packing materials can provide a leak-free packing solution for environmentally controlled applications in valves and flexible joints.

## THE PREFORMED ADVANTAGE

Compression packing is braided in a long rope spooled on a packing reel that is sold by weight or length. In the final stages, these ropes are converted into packing rings that are inserted into the annular equipment seal cavity, or the stuffing box. The packing ring is identified by size (ID x OD x thickness).

The user can choose among three common processes in forming packing rings:

- Cutting a length from the spool and then forming the rope with a set of molding dies
- Wrapping the packing rope over a mandrel that is the same diameter as the equipment spindle or stem and cutting the rings
- Cutting a length of packing with a guillotine packing cutter and wrapping it around the equipment spindle or stem

Preformed braided packing rings are much easier to install and handle than field-cut packing rings. Most packing

suppliers do not recommend field cutting unless the user insists on cutting their own rings or the customer is making emergency on-site repairs. Chances are high that field-cut rings—no matter the experience level of the technician—will have inconsistent ring lengths and edges, both of which are root causes of packing failure. If buckling or excessive leakage leads to a premature packing failure from a field-cut ring, a performance warranty may not apply.

Other advantages of using preformed braided packing rings include:

- Improved seal between the equipment shaft/stem and gland
- Less compressive load required to form a perfect seal
- Ring ends nested together without fraying
- Packing extrusion inhibited by preforming process
- Ease of inventory and storage
- Excellent conversion of axial force to radial sealing load

Users should remember, however, that preformed rings cost more than field-cut rings. The preforming process also comes with dangers to the seal. Over-compression during the packing process may fracture the rings' outside corners or squeeze out lubricant from the packing, resulting in less-lubricated rings.

## DIE MOLDS: AUTOMATIC VS. MANUAL

Easy to install and maintain, die-molded braided compression packing rings are the best option for applications in valves or pumps. Installing die-molded packing is similar to installing a cartridge mechanical seal. Both require fewer steps than packing cut from a spool by the user. Die-molded rings also eliminate many of the problems from improper ring fit.

Die-molded braided compression packing rings follow two manufacturing methods:

- An automatic molding process couples a molding hydraulic press to an automatic feed mechanism. The feed pulls the packing rope and cuts it to a predetermined length. These lengths are then inserted into the mold cavity and compressed into rings using a punch and collar die system. The upper and lower die punches are sized with the same dimension as the packing ring's

inside diameter, and the collar is sized with the same dimension as the ring's outside diameter.

- A hand die set forms high-precision rings, usually for a low-volume operation. In this process, the packing rope is cut to size—on a miter blade jig, guillotine cutter or with a packing knife—and hand inserted into a die set. The assembly is then loaded into a hydraulic press and compressed at the appropriate level to form the rings.

### CONCLUSION

Preformed packing rings are always encouraged by packing manufacturers. Incorrect ring size from field-cut rings can interfere with packing performance (e.g., poor leakage control) and reduce mean time between failures for pumps and valves. Die-molded packing rings are a top choice for maintaining consistent ring size and controlling failures.

Successful sealing with compression packing is a function of packing ring integrity and fit into the sealing chamber. Preformed packing rings and proper attention during installation allow for more reliable and successful operation of compression braided packing in plant applications.

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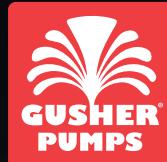
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