Comparative analysis of T.D. Williamson D-2000 closures vs. Sypris Technologies, Inc., Tube Turns Products’ Double-Bolt closures

TDW is a formidable competitor, but their closure products are not inherently superior to Sypris/Tube Turns’ closures.  The TDW D-2000 closure is primarily intended for pipeline applications (Launchers/Receivers), for horizontal installation only. The design incorporates a welding hub for attachment to the customer’s piping, a closing head, and a pair of yokes that clamp the head to the hub. The key feature of the yoke arrangement is that the yoke halves are hinged at the bottom (6:00 o’clock) position, with a cam-like release handle on the top (12:00 o’clock) position.

Early in its history, Tube Turns employed a similar bottom-hinged closure design. However, due to the vulnerability of this feature, Sypris/Tube Turns has relegated the single-hinged characteristic to 8” and smaller closures (Sypris/Tube Turns’ “Single-Bolt” closures). With a single pivot point that does not allow the yoke halves nearest the hinge to disengage from the head and hub machined surfaces until completely opened, differential wear occurs rapidly on the head, hub, and yoke surfaces nearest the pivot point. Positioned as it is in the 6:00 o’clock position, the yokes and hinge are exposed to the variably gritty and dirty process contents when opened. This necessitates thorough cleaning to avoid “grinding” the contaminants between the machined surfaces. Even if the process is “clean”, lack of adequate lubrication can still lead to uneven wear on the machined surfaces of the head, hub, and yokes. As the wear progresses, the clamping force in the worn area decreases, requiring the load to be taken up by the remaining less-worn areas. This causes the clamping pressure to progressively decrease from the hinge direction, putting increasing (and unbalanced) loads on the remainder of the yoke components. . Eventually, the amount of clamping force becomes unpredictable, and due to the fact that the cam-type open/close handle is not adjustable, it becomes possible for the head to move in relation to the hub, because the worn surfaces can no longer “center” the head, nor provide the designed clamping force. The TDW closure, once the clamping force is degraded by wear, has no way to apply additional clamping force to the yokes, because of the design of their yoke engagement linkage.

By comparison, our Double-Bolt closure not only avoids uneven wear on the yoke and hub/head flanges, it has reserve capacity to compensate for wear, using the gap between the yoke halves. The available “reserve capacity” for wear compensation is easily utilized by applying the recommended torque to the yoke bolts, and observing that the yoke separation gaps remain within tolerance. The Double-Bolt closure’s yokes separate completely from contact with the head and hub equally at top and bottom, thus avoiding “dragging” the surfaces across one another for any significant distance. Further, as they separate, the yokes provide a clear opening under the hub that allows contaminants to fall freely into a catch basin or other capture area used by the customer. Even if there are copious amounts of solids present that must be shoveled out of the opened closure, any residue that falls into the open channels of either open yoke can be easily removed, as there are no barriers or “lips” on the bottom side of the yoke channels, as there are in the TDW D-2000.

Customers have reported to us that the position of the O-Ring seal for the TDW D-2000 closure can lead to pinching and cutting of the O-Ring by the door. The D-2000 O-Ring is on the outboard side of a hub extension that the head fits over. This arrangement puts the O-Ring at risk of being pinched, crushed, or abraded unless the surfaces are aligned exactly, and the surfaces are kept clean. The hinged head necessarily contacts the hinge-side of the hub first. Operators have described to us that they come prepared with a “handful” of O-Rings when opening D-2000 closures, because the door surfaces, when dragged over the O-Ring when opening or closing, can either cause contaminants to damage the O-Ring, or the head itself impacts the O-Ring, often damaging it. We have also been told that the force required to “unstick” a D-2000 head after the yokes have been opened is sometimes more than can be applied by an individual pulling on the head handle. Situations were described where operators had to strike the head or handle from the hub side to dislodge the head from the hub.

By contrast, the Double-Bolt closure’s flat head sealing surface directly contacts and separates from the flat hub sealing surface into which the O-Ring is seated. There is no lateral movement across the O-Ring by any component. The seating surfaces are two flat planes, not a protruding structure “capped” by tightly fitted cover. The Double-Bolt closure’s head and hub expose only a narrow circumferential area on the process side of the O-Ring seal, mating flat machined surfaces, with virtually no room for process fluids to collect and “glue” the head to the hub. Our Double-Bolt closure’s o-ring is in simple compression, and the head sealing surface is lifted straight off the o-ring to open and set straight back down for closing, unlike TDW’s requirement for precise alignment.

TDW’s D2000 closure has one (1) PWD nipple, located near (but not at) the top of the closure, behind the yokes.  This is not a particularly convenient place to get to, particularly on a larger closure, or one that is elevated above ground level.  Our Double-Bolt closure has two (2) PWD devices, both located conveniently on the door side of the closure, at the 12:00 o’clock and 6:00 o’clock positions. For any closure larger than 30”, it becomes increasingly difficult to reach the upper-mounted PWD connection on a D-2000 closure. Unless a ladder or platform is provided, operators will have to find someplace to (temporarily) stand to reach TDW’s Pressure Warning Device. Double-Bolt closures in Horizontal orientation will allow the operator to reach both PWD devices from grade level even for closures as large as 66”.

The D2000 closure is consistently heavier than the Tube Turns Double-Bolt closure, by 10 to 25%, a difference of 200 to over 1000 lbs. heavier than the Double-Bolt (depending on diameter).  For those customers who are sensitive to weight issues (offshore, etc.), this could be a concern, and as part of the weight is a flat head, any size D-2000 closure will have a much more massive head to move than a similar-sized Double-Bolt closure, which utilizes a lighter, yet equally strong flanged-and-dished head profile.

TD Williamson’s D2000 closure is primarily designed for compliance with Pipeline design codes ASME B31.4, B31.8, etc.  When required to meet ASME Section VIII, Div. 1 Boiler and Pressure Vessel Code requirements, the price and lead time for the D2000 jumps dramatically past our Double-Bolt. All Sypris/Tube Turns closures are constructed of materials, built using processes, and tested in such a manner that, for a nominal fee, any closure can be provided with an ASME Code Stamp without modification.

The Sypris/Tube Turns Double-Bolt has been proven to provide reliable and secure sealing under difficult conditions, even after decades of use in the field.  The parts that wear first on the Double-Bolt are yoke bolt components, which can be replaced without taking the closure out of service.

In sizes up to 30”, the TDW D-2000 uses a lever arm to disengage the yokes.  This method is closer to the Tool-less in terms of speed, slightly faster than manually operating the dual yoke bolts on a Double-Bolt.  A chain and sprocket drive for our Double-Bolt closure would take away some of this advantage, and in 36” and smaller sizes, would still allow the cost to remain below that of a Tool-Less closure. The TDW D-2000 in 32” and larger sizes uses a single threaded yoke bolt to engage/disengage the yokes.

Please share these observations with your customer(s), and advise if you need anything further.

Add Price, Lead, Hub material quality (not ASME material, uses A694, having cracking problems when welding). Design factor of 0.5 issues as well.