Store Inert Nitrogen Instead of Air for Riser Tensioners

Market Application Publication

Safety on a drilling rig is the highest priority. However, the use of compressed air in riser tensioner systems can provide conditions that support combustion within the high pressure system. Any resultant explosion will not only threaten the safety of the rig personnel, but also the integrity of the riser and the whole drilling operation. Nitrogen is an inert gas that does not support combustion. Replacing air with nitrogen from a Parker gas generator removes this combustion risk, while also protecting the system from corrosion.

Drilling risers provide a conduit between the subsea blow out preventer and the drilling rig. The stack of risers can be thousands of feet long and although buoyant, it requires a constant tension applied from the rig to maintain its stability and to prevent damage. This is achieved by employing a riser tensioning system on board the drilling rig. The system joins the risers to the rig and constantly adjusts, maintaining the tension and compensating for the vertical motion of the rig.

The riser tensioning system uses banks of high pressure hydraulic accumulators, to provide rapid response to changes in rig position. The accumulators are charged using high pressure compressed air. With improper filter and dryer maintenance, component failure or damage, resulting oil carryover from the compressor can lead to a mix of oxygen and oil mist "fuel" within the accumulator cylinders. With the addition of a source of ignition, the result can be catastrophic. Any rupture of the air storage can become a source of oxygen to support a fire.

Using nitrogen in place of air, the risk is eliminated. Nitrogen produced from membrane systems is inherently dry and will also reduce corrosion of the system, improving long term integrity and safety.

Features and Benefits:

- Substitute air, which can support combustion, with inert nitrogen
- High pressure systems to 4500 psig or higher are available
- Complete factory start up and testing prior to delivery
- Custom designed system specifically to meet your gas needs
- Proven technology with over 50,000 successful gas generator installations worldwide

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Application:

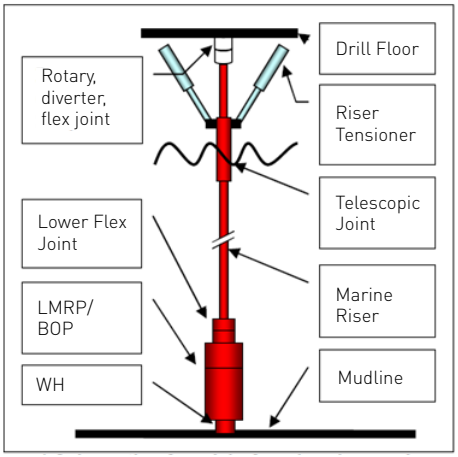


Figure 1. Schematic of a marine riser and riser system. Direct acting tensioner cylinders.*

Riser Tensioners are used to safely connect a drilling rig to the well head without undue stress on the riser connection (see figure 1). The tensioners are air over oil hydraulic cylinders that extend and retract to keep a constant tension on the risers. The cylinders are connected to the riser either directly (see figure 2) or indirectly with wires (see figure 3). High pressure air is used as a dampener over the hydraulic oil. As an alternative to high pressure air, the Parker gas generator can create high pressure, inert nitrogen on demand. The generator is delivered as a complete skid including nitrogen membranes and a high pressure booster capable of creating 4500 psig nitrogen at 95% N2. Nitrogen at that purity will not support combustion and will in fact suppress a fire should one start. Once located on the platform, The generator is simple to install. Supply the system with electricity and connect the on board compressed air system to the inlet of the generator and the outlet to a set of storage vessels. A bank of storage vessels are recommended to act as a buffer for flow fluctuations.

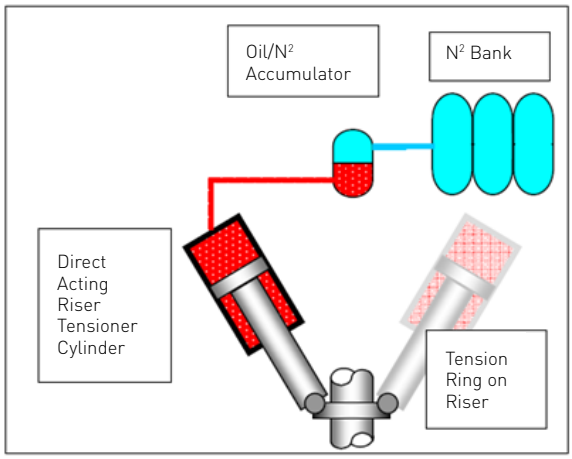


Figure 2. Sketch of direct acting tensioner cylinder.*

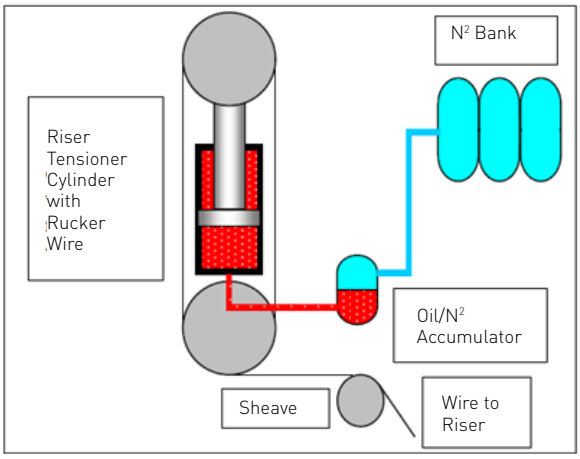
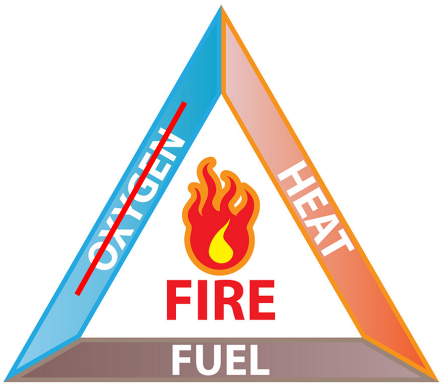


Figure 3. Sketch of conventional riser tensioner cylinder.*



*Images courtesy of AADE-11-NTCE-80, Marine drilling riser disconnect and recoil analysis, Guttorm Grytoyr, et al., 2011

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