

Case History #1185 - Tubing Leak

By Jed Doubenmier, Seal-Tite International

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Seal-Tite was contacted by a major oil company in the German Sector of the North Sea & informed that diagnostic work determined that a leak existed in the tubing hanger to tubing pup joint Fox thread connection. It was also noted that a slightly abnormal torque curve was seen during make-up of this connection. The leak rate was measured at 250 ml/min at 200 Bar with fresh water.

Seal-Tite International engineering department developed a procedure that called for setting a Monolock® plug in the tubing below the leak site, adding sealant to the tubing, allowing sealant to fall to the Monolock® and build up across the leak site. Pressure would then be applied to the tubing while monitoring the annulus for returns.

The Monolock® was set 0.7m below the leaking connection. The tubing was pressured with water and the same leak rate was observed as during troubleshooting diagnostics, thus verify that the monolock was set.

With the annulus open to vent, the tubing was then pressured with Nitrogen to displace as much water as possible through the leak site. Pressure-activated sealant specifically formulated for this application was then blended and added to the tubing.

For background, Seal-Tite International has developed a line of pressure-activated sealants that are unique in that a sustained pressure drop through a leak site causes the sealant fluid to polymerize into a flexible solid seal. The sealant remains fluid until exposed to a pressure differential. Only at the point of differential pressure, through the leak site, will the sealant reaction occur. The resulting seal is a flexible bond across the leak. The remainder of the sealant remains fluid and will not plug or damage any of the well components.



Liquid Sealant



Polymerized Sealant

After allowing the sealant to build on the Monolock® and across the leak site nitrogen pressure was applied. Since a seal was not generated with the initial formulation, additional sealant was viscosified and added to the tubing. This time a seal at 300 bar was created. A more aggressive formulation of sealant was then added to the tubing, allowing a seal at 450 bar to be generated. The pressure was locked-in and monitored for 3 days with no gas or fluid returns from annulus. After the tubing and plug were flushed with water to remove all remaining liquid sealant the Monolock® was pulled and the well turned over to production, saving the Operator approximately \$850,000.00 and four days of rig time to pull and replace tubing. The well has been on production for over 16 months with no tubing leak problems. ■

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