

## HYDROSTATIC TEST REPORT

DATE: 01-18-13 RK

- Couplings:** Crimpnology Nipple: 4" Frac Fitting, both males  
- Fitting/ferrule system rated to 400 psi. WP
- Hose:** Frac Blender Hose: 4" Goodyear Oilfield Fracturing Hose with ARC rated to 400 psi.
- Attachment:** Crimped: plated steel long ferrules
- Goal:** To exceed 1600 psi. (hose WP of 400 psi. @ 4 to 1 Safety Factor)
- Results:** Couplings and hose exceeded 4 times WP. Hose Burst at 1715 psi.

**This test was conducted to ASTM D380 standards. See Engineering details below.**

**HOSE:** 4" "GOODYEAR OILFIELD FRACTURING HOSE WITH ARC #543-710-123 400 PSI WP" 36008 Made in Canada, initial length of 28-1/2". This is the same hose as tested on 9-27-11 with our 206 one-piece hammer union product.

**END CONNECTION #1:** Assembled by Campbell, a prototype FRAC-16C fitting, specifically designed for use with FRAC hose to match the 400 psi. rating most FRAC hoses are rated. A modified FPS400460L plated steel ferrule, modified to turn it into what will become an FPS400460F plated steel ferrule with a specific length to match the FRAC-16C fitting. The hose wall on this end measured between .405" and .446" with a .433" average. Our current crimp specification guide was consulted and we followed the same crimping information as the 206 one piece hammer union in 4", page 14. The crimp for this end was interpolated for a final crimp diameter of  $\phi 4.938$ ". No lubrication was used and due to a slightly oversized hose ID, the fitting easily pushed right into the hose. The assembly was crimped on a CC-600 crimper using #120 dies. This end was connected to our tester manifold using a 4" bell reducing coupling to end in a ground joint spud for our usual 3/4" ground joint tester connection. The tester nut was hand tight. Teflon tape and pipe dope was used on the NPT threads. See first connection and first connection close up photos.

**END CONNECTION #2:** Assembled by Campbell, using the same fitting as above but due to thinner hose wall, an FPS400456F (a modified FPS400456L) was used. The hose wall on this end measured between .405" and .412" with an average of .408". The same page in our guide was used and a final crimp diameter was interpolated to be  $\phi 4.899$ ". Similarly, this end pushed right in as well. This end was connected to our standard 4" NPT machined end cap with a high-pressure valve tap. Teflon tape and pipe dope was used on the NPT threads. See second connection and second connection close up photos.

**TEST:** The assembly was filled with water and air was evacuated from the system by use of the valve at the free end. Water flowed through the assembly for about 60 minutes to stabilize temperature. Our final test temperature was 69.5°F. The assembly was made up and crimped 24 hours before the test. See in tester and inlet temp photos.

Pressure was increased, per ASTM D380 parameters and observed closely for hose stretch under the ferrule. Less than 1/64" of measurable stretch under the ferrule was seen at 800psi, about 1/32" to 3/64" at 1200 psi, 1/8" at 1600 psi and about 3/16" by 1700 psi. The hose diameter grew quite large so a picture was captured looking through the tester glass at 1200 psi, and then again at 1600 psi. so a reference as to how large the hose OD gets could be viewed. The hose burst in a violent and wet eruption, spraying water in between the tester lids, soaking the on-lookers. **The highest pressure recorded was 1715 psi.** The hose tear was large, measuring about 8" in length almost at the exact center of the exposed hose. Permanent hose stretch left after the test was about 1/32" at both ends. The end of the hose, as viewed through the ferrule slot window, was about the same, 1/32". See 1200 psi, 1600 psi, burst-1, burst-2, peak, end 1, end 1 close up, end 2 and end 2 close up photos.

**CONCLUSION:** This test was performed to test our newest fitting design, the FRAC-16C on a third different fracturing hose. Based on this test, the hose and fitting went to 4.29 times their rating, good performance for both. We are quite pleased with the performance of the new FRAC-16C fitting. Based on this test and previous testing, the rating of 400 psi @ 70° F is appropriate for the new FRAC-16C fitting properly assembled and crimped using an FPS4004XXF ferrule.