

Couplings: Cam & groove couplings: 2" Campbell Cobra stainless steel parts C x E
- Coupling/ferrule system rated to 250 psi. WP

Hose: Chemical hose: 2" Gates Mustang rated to 200 psi.

Attachment: Crimped: plated steel ferrules

Goal: To exceed 336 psi. @ 170°F (coupling/ferrule WP of 84 psi @ a 4 to 1 Safety Factor, which is 150 psi. WP @ 70°F de-rated by the elevated temperature multiplier of .56 based on temp. of 170°F)

Results: Couplings exceeded 10 times the de-rated WP. The hose exceeded 4 times WP. The coupling/ferrule connection began movement at 850 psi.

Although the test was not conducted to ASTM D380 standards due to the elevated temperature, all other aspects were in conformance. See engineering details below.

HOSE: 2" Gates Mustang 45HW acid chemical suction discharge hose, 200 psi. WP; initial length of 21-1/2."

END CONNECTION #1: Assembled by Campbell, C-316-200 C, a 2" part C cam & groove coupling with a FPS200244 steel ferrule. No lubrication was used during assembly. The hose wall on this end measured between .290" and .315" for a .303" average. The ferrule was selected and crimp diameter determined by interpolating the crimp chart due to expire 9-30-06. This end was crimped to $\phi 2.603$ " using a Uniflex HM370I crimper with 62 dies. This end was connected to our tester manifold using a A-SS-200 2" female adapter part A with a 2" x 3/4" reducing bushing and a GMS-3 3/4" male spud through our usual 3/4" ground joint style connection. Teflon tape and pipe dope was used on the NPT threads. See first end connection photo.

END CONNECTION #2: Assembled by Campbell, E-316-200C, a 2" part E cam & groove adapter with a FPS200240 steel ferrule. The hose wall on this end measured .275" to .295" or .285 average. The crimp diameter was interpolated and ferrule selected from the same chart as above. It was crimped to $\phi 2.574$ " using the same crimper and dies as above. This end was connected to a B-SS-200 2" male coupler that was fitted with a 2" female NPT valve adapter with valve attached. Teflon tape and pipe dope was used on the NPT threads. See second end connection photo.

TEST: The assembly was filled with water and air was evacuated from the system by use of the valve at the free end of the assembly. Hot water of about 180°F was flowed through the system for about 2 hours after preheating in similar fashion with 110°F water for about 1-1/2 hours. Temperature readings were taken at the inlet, outlet and of the hose and averaged to 170° F. Pressure was raised slowly for observation, but within ASTM D380 parameters. The assembly was made up and crimped 24 hours ago. See in tester photo.

At 850 psi. the first end started to move, perhaps 1/8" as compared to the end of the ferrule. Pressure was continued until the first end started leaking at 930 psi., see leak photo. No leaks were observed during the test prior to this. The hose inner tube had no tears but did show evidence of compression on a shank. Since observable movement occurred at 850 psi. that is considered the failure pressure.

CONCLUSION: Obviously, this test did not seriously test the hose's capability. However, the hose did exhibit a fair amount of elongation during the test although it was not quantified. Likewise, the cam & groove couplings are capable of more pressure.

However, this test will prove that elevated temperatures diminish retention even with a ferrule.

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