



GEORG FISCHER CENTRAL PLASTICS

ENGINEERING TEST REPORT

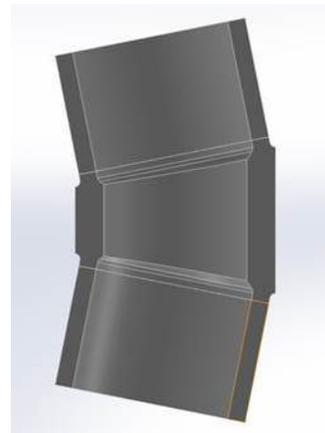
Subject:	18 IPS Butt Fusion Elbow (22.5° non-mitered segment) Qualification Report
Prepared by:	JWright
Date:	30 March 2016
Requested By :	ENGINEERING

I. Introduction (Product description and all parts tested)

Item	Quantity	Description
LN359162	15	BF, ELBOW, 22.5°, NON-MITERED, 18" IPS, DR11, BLK, PE3408/PE4710, ASTM D2513, CEE, NR, ASTM D3261, AWWA C906 NSF-61

II. Background

Sustained pressure and short-term rupture testing to the requirements of ASTM D2513-09a and ASTM D3261-12e1 was performed on the above fittings. The testing is required by CFR 49 Part 192 for qualification of the fitting design for distribution of natural gas. The fitting design incorporates 22.5° elbow segments machined from extruded polyethylene stock with non-mitered butt ends. The polyethylene has a cell classification of 445574C in accordance with ASTM D3350 and is listed in PPI TR-4 as PE4710. Multiple 22.5° segments can be joined using a qualified butt fusion procedure to create elbows up to 90 degrees. Pipe pups are butt fused to the outboard ends for operator use as well as testing. The testing is required by CFR 49 Part 192.191 for qualification of the fitting design for gas and pressure service.



Qualification of the fusion procedure to the requirements of CFR 49 Part 192.283 and the fusion operator to the requirements of CFR 49 Part 192.285 was completed through tests performed on these fittings. Additional destructive fusion tests were performed for operator training records.

III. Procedure

The test assemblies consisted of capped 30" segments of 18" SDR 11 PE4710 pipe butt fused to each end of the machined 22.5° segment.

As described under ASTM D2513 and D3261 the parts must be subjected to the following performance tests and methods:

ASTM D1598-15a - Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.

- 3 each of the test assemblies were filled with water and conditioned in a circulated water bath. The assemblies were subjected to internal pressure test conditions as described in ASTM D1598. The test temperature was maintained at 80C (±2C) at an internal hoop

stress of 750 psi for the duration of the test. The minimum required time on test without failure is 200 hours.

- 6 each of the test assemblies were filled with water and conditioned in air to 73F. The assemblies were subjected to internal pressure test conditions as described in ASTM D2513. The test temperature was maintained at 73F ($\pm 3F$) at an internal hoop stress of 1600 psi (320 psig) for the duration of the test. The minimum required time on test without failure is 1000 hours.

ASTM D1599-14e1 – Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings – Procedure B

- 6 each of the test assemblies were filled with water and conditioned at 73F. The assemblies were subjected to uniformly increased pressure to achieve 580 psig internal pressure before 70 seconds elapsed. The minimum burst pressure required to pass the test was 580 psig. The maximum pressure achieved was recorded for each test assembly.

IV. Results

All fittings tested exceeded the minimum requirements without failure.

**Sustained Pressure Test (ASTM D1598)
750 psi Hoop Stress @ 80°C / 200 Hours Minimum
3 Specimens**

SPECIMEN PRESSURE	TOTAL HOURS ON TEST	RESULT
150 PSIG	476.4*	PASS

*Test terminated without failure.

**Sustained Pressure Test (ASTM D1598)
1600 psi Hoop Stress @ 73°F / 1000 Hours Minimum
6 Specimens**

SPECIMEN PRESSURE	TOTAL HOURS ON TEST	RESULT
320 PSIG	1,008*	PASS

*Test terminated without failure.

**Short Term Hydraulic Pressure Test (ASTM D1599)
2900 psi Hoop Stress Minimum Burst (580 psig)
6 Specimens**

SPECIMEN FAILURE	SPECIMEN PRESSURE	RESULT
2 each -Ductile in Pipe Section	640 psig at 70 seconds	PASS / 960 psig peak
2 each -Ductile in Pipe Section	640 psig at 70 seconds	PASS / 980 psig peak
2 each -Ductile in Pipe Section	640 psig at 70 seconds	PASS / 988 psig peak

Test result: **PASS**

Report Approved:

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