CSI: DIVISION: 22 00 00 — PLUMBING
Section: 22 11 16 — Domestic Water Piping

Product certification system:

The ICC-ES product certification system includes testing samples taken from the market or supplier's stock, or a combination of both, to verify compliance with applicable codes and standards. The system also involves factory inspections, and assessment and surveillance of the supplier's quality system.

Product: ePIPE® Epoxy System
ePIPE® FRS Epoxy System

Listee: ACE Duraflo® Systems, LLC
2926 W. Pendleton Ave.,
Santa Ana, California 92704
www.aceduraflo.com

Compliance with the following codes:

2024, 2021, 2018, 2015, 2012 and 2009 *International Plumbing Code*® (IPC)
2024, 2021, 2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)
2024, 2021, 2018, 2015, 2012 and 2009 *Uniform Plumbing Code*® (UPC)*
**Uniform Plumbing Code*® is a copyrighted publication of the International Association of Plumbing and Mechanical Officials.

Compliance with the following standards:

ASTM F2831-2019(R2024) Standard Practice for Internal Non Structural Epoxy Barrier Coating Material Used In Rehabilitation of Metallic Pressurized Piping Systems
ICC-ES LC1008-2009, PMG Listing Criteria for Internal Epoxy Barrier Pipe Coating Material for Water Supply Systems
ASTM D 4541-2022, Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers
NSF/ANSI/CAN 61-2023, Section 5, Drinking Water System Components – Health Effects
AWWA C210-2015, Liquid Epoxy Coating and Lining for Steel Water Pipe and Fittings
IAPMO IGC189-2019, Internal Pipe Epoxy Barrier Coating Material for Application in Pressurized (Closed) Water Piping Systems

Identification:

Each container bears a label marked Part A or Part B, with the manufacturer's name (ACE DuraFlo®), the NSF 61 designation, product name and size, the ICC-ES PMG listing mark. See Figure 1. Each container is stamped on the top with the date of manufacture and the batch number. See Figure 2.

Internally coated pipe and tubing shall be permanently and legibly marked on each outlet and on the outside of exposed pipe with the following marking applied at intervals of not more than 20 ft. Manufacturer's name or trademark and coating designation and material with prohibition on the use of flame and heat to repair any part of system. See figure 3.

Installation:

The ePIPE® System must be applied by authorized applicators trained by ACE DuraFlo® Systems, LLC. The following steps comprise the installation sequence:

1. The existing piping system is partially disassembled into separate sections, with flexible tube, valves and gasketed connections removed.
2. Each section is air-dried and sandblasted clean in accordance with the manufacturer's published instructions. The cleaned surface, when viewed without magnification, must be free of all visible oil, grease, dirt, mill scale, rust and previously applied coatings. Evenly dispersed, very light shadows, streaks, and discolorations caused by stains of mill scale, rust and old coatings are permitted to remain on no more than 33 percent of the surface. Slight residues of rust and old coatings are permitted to be left in the craters of pits, if the original surface is pitted. Upon completion, this level of cleaning must be visually verified and recorded by the applicator.
3. Each section is then pressure-tested with air to 100 psi (689.5 kPa), to verify that the pipe has no holes, cracks or leaks. Identified leaks must be repaired prior to coating.
4. Using proprietary measuring and application equipment provided by ACE DuraFlo® Systems, ePIPE® is applied in one end of a pipe or tube section and forced by air pressure through the section.
5. After drying in accordance with the manufacturer's instructions, the ePIPE® applicator then reassembles the piping system and hydrostatically pressure tests to 150 psi (1034 kPa) in the presence of the code official or the official's designated representative or as determined by the authority having jurisdiction.
6. The completed system shall be flow tested and the piping system shall be required to meet the minimum flow rates specified in the model codes (UPC, IPC, NSPC) or approved by the local authority.

7. Design: See Tables 1-12 for flow rates and pressure drop based on an average coating thickness of .12 inch (3.048mm).

Models:

ACE DuraFlo® ePIPE® Systems is a proprietary, two-part, mechanically mixed epoxy material that is pneumatically applied to the interior of cleaned rigid-galvanized pipe or copper tube used to convey pressurized potable water. ePIPE® system is composed of 100 percent solids, two-component epoxy, mixed to the manufacturer's specification, which meets the requirements of NSF 61 Section 5. The ePIPE® System is recognized for application on metallic pipes from $^1/_2$ inch to 36 inches (12.7 to 914.4 mm) in diameter. The installed minimum thickness of the coating must be 0.004 inch (0.10 mm) on all sizes. The installed maximum single coat field use dry thickness is 0.12 inch (3.048 mm). The ePIPE® System is not for application on flexible pressure pipe or valves or on gasketed connections. The ePIPE® logo is shown in Figure 1.

ACE DuraFlo® ePIPE FRS is a 2-part hydrophobic epoxy material, reddish brown in color when mixed. ePIPE FRS may be used in the same application as to ePIPE®, and is recognized for immediate return to service.

Conditions of Listing:

1. The ePIPE® system must be installed in accordance with this listing and the manufacturer's published installation instructions. In the event of a conflict, the instructions in this listing govern.
2. The existing piping system must be fabricated from metallic pipe materials in accordance with the applicable codes.
3. All leaks must be repaired prior to coating in such a way so as to restore the affected sections to a code-complying condition.
4. The ePIPE® Epoxy Coated Piping System is manufactured under a quality control program with annual surveillance inspections by ICC-ES.

TABLE 1—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 1/2-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 0.329		Type L ID= 0.305		Type K ID= 0.287	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
1.00	3.77	7.69	4.39	11.23	4.96	15.22
2.00	7.55	30.76	8.78	44.92	9.92	60.89
3.00	11.32	69.21	13.17	101.08	14.88	137.01
4.00	15.10	123.04	17.57	179.70	19.84	243.57
5.00	18.87	192.26	21.96	280.78	24.80	380.58
6.00	22.64	276.85	26.35	404.32	29.76	548.04
7.00	26.42	376.82	30.74	550.32	34.72	745.94
8.00	30.19	492.17	35.13	718.78	39.67	974.29
9.00	33.97	622.91	39.52	909.71	44.63	1233.09
10.00	37.74	769.02	43.91	1123.10	49.59	1522.33
11.00	41.51	930.52	48.30	1358.95	54.55	1842.02
12.00	45.29	1107.39	52.70	1617.27	59.51	2192.15
13.00	49.06	1299.65	57.09	1898.04	64.47	2572.74
14.00	52.84	1507.28	61.48	2201.28	69.43	2983.76
15.00	56.61	1730.30	65.87	2526.98	74.39	3425.24
16.00	60.38	1968.69	70.26	2875.14	79.35	3897.16
17.00	64.16	2222.47	74.65	3245.76	84.31	4399.53
18.00	67.93	2491.63	79.04	3638.85	89.27	4932.35

TABLE 2—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 3/4-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 0.571		Type L ID= 0.545		Type K ID= 0.505	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
1.00	1.25	0.47	1.38	0.59	1.60	0.86
2.00	2.51	1.86	2.75	2.35	3.20	3.45
3.00	3.76	4.20	4.13	5.30	4.81	7.75
4.00	5.01	7.46	5.50	9.42	6.41	13.78
5.00	6.26	11.65	6.88	14.71	8.01	21.54
6.00	7.52	16.78	8.25	21.19	9.61	31.02
7.00	8.77	22.84	9.63	28.84	11.21	42.21
8.00	10.02	29.83	11.00	37.66	12.81	55.14
9.00	11.28	37.76	12.38	47.67	14.42	69.78
10.00	12.53	46.62	13.75	58.85	16.02	86.15
11.00	13.78	56.41	15.13	71.21	17.62	104.24
12.00	15.03	67.13	16.50	84.74	19.22	124.06
13.00	16.29	78.78	17.88	99.46	20.82	145.60
14.00	17.54	91.37	19.25	115.35	22.43	168.86
15.00	18.79	104.89	20.63	132.41	24.03	193.84
16.00	20.05	119.34	22.00	150.66	25.63	220.55
17.00	21.30	134.72	23.38	170.08	27.23	248.98
18.00	22.55	151.04	24.76	190.67	28.83	279.14
19.00	23.81	168.29	26.13	212.45	30.43	311.01
20.00	25.06	186.47	27.51	235.40	32.04	344.61
21.00	26.31	205.58	28.88	259.53	33.64	379.93
22.00	27.56	225.63	30.26	284.83	35.24	416.98
23.00	28.82	246.60	31.63	311.31	36.84	455.75
24.00	30.07	268.51	33.01	338.97	38.44	496.24
25.00	31.32	291.36	34.38	367.81	40.04	538.45
26.00	32.58	315.13	35.76	397.82	41.65	582.39
27.00	33.83	339.84	37.13	429.01	43.25	628.05
28.00	35.08	365.48	38.51	461.38	44.85	675.44
29.00	36.33	392.05	39.88	494.93	46.45	724.54
30.00	37.59	419.55	41.26	529.65	48.05	775.38
31.00	38.84	447.99	42.63	565.54	49.66	827.93
32.00	40.09	477.36	44.01	602.62	51.26	882.20
33.00	41.35	507.66	45.38	640.87	52.86	938.20

TABLE 3—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 1-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 0.822		Type L ID= 0.785		Type K ID= 0.755	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
2.00	1.21	0.29	1.33	0.36	1.43	0.44
4.00	2.42	1.15	2.65	1.45	2.87	1.76
6.00	3.63	2.59	3.98	3.25	4.30	3.95
8.00	4.84	4.60	5.30	5.79	5.73	7.03
10.00	6.05	7.18	6.63	9.04	7.17	10.98
12.00	7.25	10.34	7.95	13.02	8.60	15.82
14.00	8.46	14.07	9.28	17.72	10.03	21.53
16.00	9.67	18.38	10.61	23.14	11.47	28.12
18.00	10.88	23.27	11.93	29.29	12.90	35.59
20.00	12.09	28.72	13.26	36.16	14.33	43.94
22.00	13.30	34.76	14.58	43.76	15.77	53.17
24.00	14.51	41.36	15.91	52.07	17.20	63.27
26.00	15.72	48.54	17.24	61.11	18.63	74.26
28.00	16.93	56.30	18.56	70.88	20.07	86.12
30.00	18.14	64.63	19.89	81.36	21.50	98.86
32.00	19.35	73.53	21.21	92.57	22.93	112.49
34.00	20.56	83.01	22.54	104.51	24.37	126.99
36.00	21.76	93.06	23.86	117.16	25.80	142.37
38.00	22.97	103.69	25.19	130.54	27.23	158.62
40.00	24.18	114.89	26.52	144.65	28.67	175.76
42.00	25.39	126.67	27.84	159.47	30.10	193.77
44.00	26.60	139.02	29.17	175.02	31.53	212.67
46.00	27.81	151.95	30.49	191.29	32.96	232.44

TABLE 4—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 1 1/4-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 1.051		Type L ID= 1.025		Type K ID= 1.005	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
5.00	1.85	0.53	1.94	0.60	2.02	0.66
8.00	2.96	1.34	3.11	1.52	3.24	1.68
11.00	4.07	2.54	4.28	2.88	4.45	3.18
14.00	5.18	4.12	5.44	4.67	5.66	5.15
17.00	6.29	6.07	6.61	6.88	6.88	7.60
20.00	7.40	8.41	7.78	9.53	8.09	10.51
23.00	8.51	11.12	8.94	12.60	9.30	13.90
26.00	9.62	14.21	10.11	16.10	10.52	17.77
29.00	10.72	17.67	11.28	20.03	11.73	22.10
32.00	11.83	21.52	12.44	24.39	12.94	26.91
35.00	12.94	25.74	13.61	29.18	14.16	32.20
38.00	14.05	30.34	14.77	34.39	15.37	37.95
41.00	15.16	35.32	15.94	40.04	16.58	44.18
44.00	16.27	40.68	17.11	46.11	17.80	50.89
47.00	17.38	46.42	18.27	52.61	19.01	58.06
50.00	18.49	52.54	19.44	59.54	20.22	65.71
53.00	19.60	59.03	20.61	66.90	21.44	73.83
56.00	20.71	65.90	21.77	74.69	22.65	82.43
59.00	21.82	73.15	22.94	82.91	23.86	91.49
62.00	22.93	80.78	24.11	91.56	25.08	101.04
65.00	24.04	88.78	25.27	100.63	26.29	111.05
68.00	25.15	97.17	26.44	110.13	27.50	121.54
71.00	26.26	105.93	27.61	120.07	28.72	132.50
74.00	27.37	115.07	28.77	130.43	29.93	143.93
77.00	28.48	124.59	29.94	141.22	31.14	155.84

TABLE 5—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), $1^1/_2$-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 1.287		Type L ID= 1.265		Type K ID= 1.241	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
10.00	2.47	0.73	2.55	0.79	2.65	0.87
13.00	3.21	1.23	3.32	1.34	3.45	1.47
16.00	3.95	1.86	4.08	2.02	4.24	2.23
19.00	4.69	2.62	4.85	2.85	5.04	3.14
22.00	5.43	3.51	5.62	3.83	5.84	4.21
25.00	6.17	4.53	6.38	4.94	6.63	5.44
28.00	6.91	5.68	7.15	6.20	7.43	6.82
31.00	7.65	6.97	7.91	7.60	8.22	8.36
34.00	8.39	8.38	8.68	9.14	9.02	10.05
37.00	9.13	9.93	9.45	10.82	9.81	11.91
40.00	9.86	11.60	10.21	12.65	10.61	13.92
43.00	10.60	13.41	10.98	14.61	11.41	16.08
46.00	11.34	15.34	11.74	16.72	12.20	18.40
49.00	12.08	17.41	12.51	18.98	13.00	20.88
52.00	12.82	19.61	13.27	21.37	13.79	23.52
55.00	13.56	21.93	14.04	23.91	14.59	26.31
58.00	14.30	24.39	14.81	26.59	15.38	29.26
61.00	15.04	26.98	15.57	29.41	16.18	32.36
64.00	15.78	29.70	16.34	32.37	16.98	35.63
67.00	16.52	32.55	17.10	35.48	17.77	39.04
70.00	17.26	35.53	17.87	38.73	18.57	42.62
73.00	18.00	38.64	18.64	42.12	19.36	46.35
76.00	18.74	41.88	19.40	45.65	20.16	50.24
79.00	19.48	45.25	20.17	49.32	20.95	54.28
82.00	20.22	48.75	20.93	53.14	21.75	58.48
85.00	20.96	52.38	21.70	57.10	22.55	62.84
88.00	21.70	56.15	22.46	61.20	23.34	67.35
91.00	22.44	60.04	23.23	65.45	24.14	72.02

TABLE 6—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 2-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 1.822		Type L ID= 1.745		Type K ID= 1.719	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
20.00	2.46	0.48	2.68	0.60	2.76	0.65
25.00	3.08	0.75	3.35	0.94	3.46	1.01
30.00	3.69	1.09	4.02	1.35	4.15	1.45
35.00	4.31	1.48	4.70	1.84	4.84	1.98
40.00	4.92	1.93	5.37	2.40	5.53	2.59
45.00	5.54	2.45	6.04	3.04	6.22	3.27
50.00	6.15	3.02	6.71	3.75	6.91	4.04
55.00	6.77	3.65	7.38	4.53	7.60	4.89
60.00	7.38	4.35	8.05	5.40	8.29	5.82
65.00	8.00	5.10	8.72	6.33	8.99	6.83
70.00	8.61	5.92	9.39	7.34	9.68	7.92
75.00	9.23	6.79	10.06	8.43	10.37	9.09
80.00	9.84	7.73	10.73	9.59	11.06	10.34
85.00	10.46	8.73	11.40	10.83	11.75	11.67
90.00	11.07	9.78	12.07	12.14	12.44	13.09
95.00	11.69	10.90	12.74	13.53	13.13	14.58
100.00	12.31	12.08	13.42	14.99	13.82	16.16
105.00	12.92	13.32	14.09	16.53	14.52	17.81
110.00	13.54	14.62	14.76	18.14	15.21	19.55
115.00	14.15	15.97	15.43	19.82	15.90	21.37
120.00	14.77	17.39	16.10	21.58	16.59	23.27
125.00	15.38	18.87	16.77	23.42	17.28	25.25
130.00	16.00	20.41	17.44	25.33	17.97	27.31
135.00	16.61	22.01	18.11	27.32	18.66	29.45
140.00	17.23	23.67	18.78	29.38	19.35	31.67
145.00	17.84	25.40	19.45	31.52	20.04	33.97
150.00	18.46	27.18	20.12	33.73	20.74	36.36
155.00	19.07	29.02	20.79	36.01	21.43	38.82
160.00	19.69	30.92	21.46	38.37	22.12	41.36
165.00	20.30	32.88	22.14	40.81	22.81	43.99

TABLE 7—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 2-1 1/2-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 2.255		Type L ID= 2.225		Type K ID= 2.195	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
50.00	4.02	0.98	4.13	1.05	4.24	1.12
55.00	4.42	1.19	4.54	1.27	4.66	1.36
60.00	4.82	1.41	4.95	1.51	5.09	1.62
65.00	5.22	1.66	5.36	1.77	5.51	1.90
70.00	5.62	1.92	5.78	2.06	5.93	2.20
75.00	6.02	2.21	6.19	2.36	6.36	2.53
80.00	6.43	2.51	6.60	2.69	6.78	2.88
85.00	6.83	2.84	7.01	3.03	7.21	3.25
90.00	7.23	3.18	7.43	3.40	7.63	3.64
95.00	7.63	3.55	7.84	3.79	8.05	4.06
100.00	8.03	3.93	8.25	4.20	8.48	4.50
105.00	8.43	4.33	8.66	4.63	8.90	4.96
110.00	8.84	4.75	9.08	5.08	9.33	5.44
115.00	9.24	5.20	9.49	5.56	9.75	5.95
120.00	9.64	5.66	9.90	6.05	10.17	6.47
125.00	10.04	6.14	10.31	6.56	10.60	7.02
130.00	10.44	6.64	10.73	7.10	11.02	7.60
135.00	10.84	7.16	11.14	7.66	11.45	8.19
140.00	11.25	7.70	11.55	8.23	11.87	8.81
145.00	11.65	8.26	11.96	8.83	12.29	9.45
150.00	12.05	8.84	12.38	9.45	12.72	10.11
155.00	12.45	9.44	12.79	10.09	13.14	10.80
160.00	12.85	10.06	13.20	10.75	13.57	11.51
165.00	13.25	10.70	13.61	11.44	13.99	12.24
170.00	13.66	11.35	14.03	12.14	14.41	12.99
175.00	14.06	12.03	14.44	12.86	14.84	13.77
180.00	14.46	12.73	14.85	13.61	15.26	14.57
185.00	14.86	13.45	15.27	14.38	15.69	15.39
190.00	15.26	14.18	15.68	15.16	16.11	16.23
195.00	15.66	14.94	16.09	15.97	16.53	17.09
200.00	16.07	15.71	16.50	16.80	16.96	17.98
205.00	16.47	16.51	16.92	17.65	17.38	18.89
210.00	16.87	17.32	17.33	18.52	17.80	19.83
215.00	17.27	18.16	17.74	19.42	18.23	20.78
220.00	17.67	19.01	18.15	20.33	18.65	21.76
225.00	18.07	19.89	18.57	21.27	19.08	22.76

TABLE 8—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 3-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 2.741		Type L ID= 2.705		Type K ID= 2.667	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
50.00	2.72	0.37	2.79	0.40	2.87	0.42
60.00	3.26	0.53	3.35	0.57	3.45	0.61
70.00	3.81	0.73	3.91	0.78	4.02	0.83
80.00	4.35	0.95	4.47	1.01	4.59	1.09
90.00	4.89	1.20	5.02	1.28	5.17	1.38
100.00	5.44	1.48	5.58	1.58	5.74	1.70
110.00	5.98	1.79	6.14	1.91	6.32	2.05
120.00	6.52	2.13	6.70	2.28	6.89	2.44
130.00	7.07	2.50	7.26	2.67	7.47	2.87
140.00	7.61	2.90	7.82	3.10	8.04	3.33
150.00	8.16	3.33	8.37	3.56	8.61	3.82
160.00	8.70	3.79	8.93	4.05	9.19	4.35
170.00	9.24	4.28	9.49	4.57	9.76	4.91
180.00	9.79	4.80	10.05	5.12	10.34	5.50
190.00	10.33	5.34	10.61	5.71	10.91	6.13
200.00	10.87	5.92	11.17	6.33	11.49	6.79
210.00	11.42	6.53	11.72	6.98	12.06	7.49
220.00	11.96	7.17	12.28	7.66	12.63	8.22
230.00	12.51	7.83	12.84	8.37	13.21	8.98
240.00	13.05	8.53	13.40	9.11	13.78	9.78
250.00	13.59	9.25	13.96	9.89	14.36	10.61
260.00	14.14	10.01	14.52	10.69	14.93	11.48
270.00	14.68	10.79	15.07	11.53	15.51	12.38
280.00	15.22	11.61	15.63	12.40	16.08	13.31
290.00	15.77	12.45	16.19	13.30	16.65	14.28
300.00	16.31	13.32	16.75	14.24	17.23	15.28
310.00	16.86	14.23	17.31	15.20	17.80	16.31
320.00	17.40	15.16	17.87	16.20	18.38	17.38
330.00	17.94	16.12	18.42	17.22	18.95	18.49
340.00	18.49	17.11	18.98	18.28	19.53	19.62
350.00	19.03	18.14	19.54	19.38	20.10	20.80
360.00	19.57	19.19	20.10	20.50	20.67	22.00
370.00	20.12	20.27	20.66	21.65	21.25	23.24
380.00	20.66	21.38	21.21	22.84	21.82	24.51
390.00	21.20	22.52	21.77	24.06	22.40	25.82

TABLE 9—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 3-1/2-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 3.219		Type L ID= 3.185		Type K ID= 3.145	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
90.00	3.55	0.54	3.62	0.57	3.72	0.60
100.00	3.94	0.66	4.03	0.70	4.13	0.74
110.00	4.34	0.80	4.43	0.85	4.54	0.90
120.00	4.73	0.95	4.83	1.01	4.96	1.07
130.00	5.12	1.12	5.23	1.18	5.37	1.26
140.00	5.52	1.30	5.64	1.37	5.78	1.46
150.00	5.91	1.49	6.04	1.57	6.19	1.68
160.00	6.31	1.70	6.44	1.79	6.61	1.91
170.00	6.70	1.92	6.85	2.02	7.02	2.15
180.00	7.10	2.15	7.25	2.26	7.43	2.41
190.00	7.49	2.39	7.65	2.52	7.85	2.69
200.00	7.88	2.65	8.05	2.80	8.26	2.98
210.00	8.28	2.92	8.46	3.08	8.67	3.28
220.00	8.67	3.21	8.86	3.38	9.09	3.60
230.00	9.07	3.51	9.26	3.70	9.50	3.94
240.00	9.46	3.82	9.66	4.03	9.91	4.29
250.00	9.86	4.14	10.07	4.37	10.32	4.65
260.00	10.25	4.48	10.47	4.72	10.74	5.03
270.00	10.64	4.83	10.87	5.09	11.15	5.43
280.00	11.04	5.20	11.28	5.48	11.56	5.84
290.00	11.43	5.57	11.68	5.88	11.98	6.26
300.00	11.83	5.96	12.08	6.29	12.39	6.70
310.00	12.22	6.37	12.48	6.72	12.80	7.15
320.00	12.62	6.79	12.89	7.16	13.22	7.62
330.00	13.01	7.22	13.29	7.61	13.63	8.11
340.00	13.40	7.66	13.69	8.08	14.04	8.61
350.00	13.80	8.12	14.09	8.56	14.45	9.12
360.00	14.19	8.59	14.50	9.06	14.87	9.65
370.00	14.59	9.07	14.90	9.57	15.28	10.19
380.00	14.98	9.57	15.30	10.09	15.69	10.75
390.00	15.37	10.08	15.70	10.63	16.11	11.32
400.00	15.77	10.60	16.11	11.18	16.52	11.91
410.00	16.16	11.14	16.51	11.75	16.93	12.51
420.00	16.56	11.69	16.91	12.33	17.35	13.13
430.00	16.95	12.25	17.32	12.92	17.76	13.77

TABLE 10—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 4-INCH COPPER TUBING, ASTM B88 WITH 120-MIL ACE DURAFLO® COATING

Flow Rate	Type M ID= 3.695		Type L ID= 3.665		Type K ID= 3.617	
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
200.00	5.98	1.33	6.08	1.39	6.24	1.48
220.00	6.58	1.61	6.69	1.68	6.87	1.79
240.00	7.18	1.92	7.30	2.00	7.49	2.13
260.00	7.78	2.25	7.91	2.34	8.12	2.50
280.00	8.38	2.61	8.52	2.72	8.74	2.90
300.00	8.98	2.99	9.12	3.12	9.37	3.33
320.00	9.57	3.41	9.73	3.55	9.99	3.79
340.00	10.17	3.84	10.34	4.00	10.62	4.28
360.00	10.77	4.31	10.95	4.49	11.24	4.80
380.00	11.37	4.80	11.56	5.00	11.87	5.34
400.00	11.97	5.32	12.16	5.54	12.49	5.92
420.00	12.57	5.87	12.77	6.11	13.11	6.53
440.00	13.16	6.44	13.38	6.71	13.74	7.16
460.00	13.76	7.04	13.99	7.33	14.36	7.83
480.00	14.36	7.66	14.60	7.98	14.99	8.52
500.00	14.96	8.31	15.21	8.66	15.61	9.25
520.00	15.56	8.99	15.81	9.37	16.24	10.00
540.00	16.16	9.70	16.42	10.10	16.86	10.79
560.00	16.76	10.43	17.03	10.86	17.49	11.60
580.00	17.35	11.19	17.64	11.65	18.11	12.45
600.00	17.95	11.97	18.25	12.47	18.73	13.32
620.00	18.55	12.78	18.86	13.32	19.36	14.22
640.00	19.15	13.62	19.46	14.19	19.98	15.16
660.00	19.75	14.49	20.07	15.09	20.61	16.12
680.00	20.35	15.38	20.68	16.02	21.23	17.11
700.00	20.94	16.30	21.29	16.97	21.86	18.13
720.00	21.54	17.24	21.90	17.96	22.48	19.18
740.00	22.14	18.21	22.50	18.97	23.11	20.26
760.00	22.74	19.21	23.11	20.01	23.73	21.37
780.00	23.34	20.23	23.72	21.08	24.35	22.51
800.00	23.94	21.28	24.33	22.17	24.98	23.68
820.00	24.53	22.36	24.94	23.29	25.60	24.88
840.00	25.13	23.47	25.55	24.44	26.23	26.11
860.00	25.73	24.60	26.15	25.62	26.85	27.37
880.00	26.33	25.75	26.76	26.83	27.48	28.65

TABLE 11—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 1/2-INCH, 3/4-INCH AND 1-INCH GALVANIZED STEEL PIPE, ASTM A53 WITH 10-MIL ACE DURAFLO® COATING

Flow Rate	1/2" ID=	0.602	3/4" ID=	0.804	1" ID=	1.029
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
1.00	1.13	0.37	0.63	0.09	0.39	0.03
2.00	2.25	1.50	1.26	0.35	0.77	0.10
3.00	3.38	3.37	1.90	0.79	1.16	0.23
4.00	4.51	6.00	2.53	1.41	1.54	0.41
5.00	5.64	9.37	3.16	2.21	1.93	0.64
6.00	6.76	13.50	3.79	3.18	2.31	0.93
7.00	7.89	18.37	4.42	4.32	2.70	1.26
8.00	9.02	23.99	5.06	5.65	3.09	1.64
9.00	10.14	30.37	5.69	7.15	3.47	2.08
10.00	11.27	37.49	6.32	8.82	3.86	2.57
11.00	12.40	45.36	6.95	10.68	4.24	3.11
12.00	13.53	53.99	7.58	12.71	4.63	3.70
13.00	14.65	63.36	8.22	14.91	5.02	4.34
14.00			8.85	17.29	5.40	5.04
15.00			9.48	19.85	5.79	5.78
16.00			10.11	22.59	6.17	6.58
17.00			10.74	25.50	6.56	7.43
18.00			11.37	28.59	6.94	8.33
19.00			12.01	31.85	7.33	9.28
20.00			12.64	35.29	7.72	10.28
21.00			13.27	38.91	8.10	11.33
22.00			13.90	42.71	8.49	12.44
23.00			14.53	46.68	8.87	13.59
24.00					9.26	14.80
25.00					9.64	16.06
26.00					10.03	17.37
27.00					10.42	18.73
28.00					10.80	20.14
29.00					11.19	21.61

TABLE 12—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER), 1 1/4-INCH, 1 1/2-INCH AND 2-INCH GALVANIZED STEEL PIPE, ASTM A53 WITH 10-MIL ACE DURAFLO COATING

Flow Rate	1 1/4" ID=	1.360	1 1/2" ID=	1.590	2" ID=	2.047
(gpm)	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
10.00	2.21	0.61	1.62	0.28	0.97	0.08
15.00	3.31	1.37	2.42	0.63	1.46	0.18
20.00	4.42	2.43	3.23	1.11	1.95	0.31
25.00	5.52	3.80	4.04	1.74	2.44	0.49
30.00	6.63	5.47	4.85	2.51	2.92	0.71
35.00	7.73	7.45	5.66	3.41	3.41	0.96
40.00	8.83	9.73	6.46	4.46	3.90	1.26
45.00	9.94	12.32	7.27	5.64	4.39	1.59
50.00	11.04	15.20	8.08	6.96	4.87	1.97
55.00	12.15	18.40	8.89	8.42	5.36	2.38
60.00	13.25	21.89	9.69	10.02	5.85	2.83
65.00	14.36	25.70	10.50	11.76	6.34	3.33
70.00	15.46	29.80	11.31	13.64	6.82	3.86
75.00	16.56	34.21	12.12	15.66	7.31	4.43
80.00			12.93	17.82	7.80	5.04
85.00			13.73	20.12	8.29	5.69
90.00			14.54	22.55	8.77	6.38
95.00			15.35	25.13	9.26	7.11
100.00			16.16	27.84	9.75	7.87
105.00			16.97	30.70	10.24	8.68
110.00					10.72	9.53
115.00					11.21	10.41
120.00					11.70	11.34
125.00					12.19	12.30
130.00					12.67	13.31
135.00					13.16	14.35
140.00					13.65	15.43
145.00					14.14	16.55
150.00					14.62	17.71
155.00					15.11	18.91

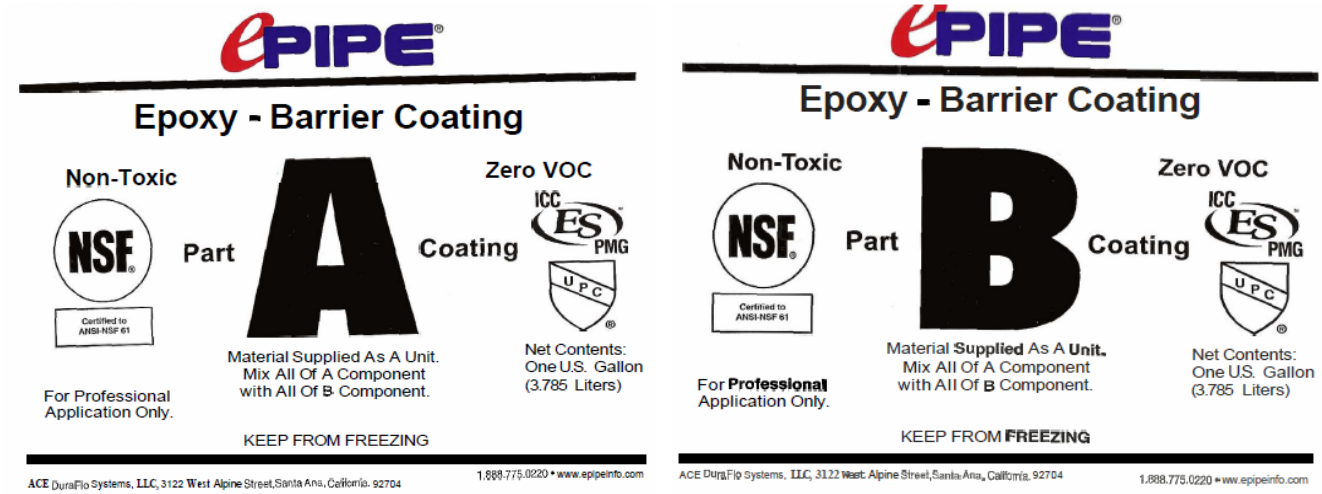

Figure 1 – Epoxy Canister Label

Figure 2 – Date and Batch Number Stamp on Top of Canister

Figure 3 – Caution Label