

ICC-ES PMG Listing

PMG-1009

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This listing is subject to re-examination in one year.

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CSI: DIVISION: 15—MECHANICAL
Section: 15140—Domestic Water Piping

Product: ePIPE™ Epoxy Lined Piping System—Uses ADF-204 epoxy to coat the interior of existing but cleaned galvanized steel pipe or copper rigid tube pressurized potable water supply systems

Listee: Ace Duraflo® Systems, LLC
1370 Reynolds Avenue, Suite 112
Irvine, California 92614-5546
www.fixmypipes.com

Compliance with the following codes:

2009 *International Plumbing Code*® (IPC)
2009 *International Residential Code*® (IRC)

Compliance with the following standard(s):

LC1008
ASTM D 4541
NSF 61, Section 5
AWWA C210

Identification:

ADF-204 Epoxy: Each container bears a label marked Part A or Part B, with the manufacturer's name (ACE DuraFlo®), the NSF 61 designation, the name of the third-party inspection agency (NSF), and the ICC-ES PMG listing mark. The ICC-ES PMG listing number (PMG-1009) is optional. Each container is stamped on the top with the date of manufacture and the batch number.

Coated Piping or Rigid Tubing: At a maximum distance of 20 feet (6096 mm) along coated pipe or tube, and at each fixture connection, a label is attached indicating the manufacturer's name (ACE DuraFlo®), NSF-PW, the words "Attention, epoxy lined piping," the product name (ADF204), and either the ICC-ES PMG listing mark. The ICC-ES PMG listing number (PMG-1009) is optional. The label includes a warning against using flame or heat when repairing any part of the piping system. See Figure 2.

Installation:

The ePIPE™ System must be applied by authorized applicators trained by ACE DuraFlo® Systems, LLC. Existing piping or rigid tubes must be in good condition, with any cracks or leaks or visible signs of corrosion repaired. 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.
4. Using proprietary measuring and application equipment provided by ACE DuraFlo® Systems, ADF-204 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 (1 034 kPa) in the presence of the code official or the official's designated representative.
6. In the presence of the code official or designated representative, the ePIPE™ applicator then conducts a flow test to verify the minimum flow rate to each fixture in accordance with Table 604.3 of the IPC.
7. Design: See Tables 1-4 for flow rates and pressure drop based on an average coating thickness of 0.010 inch (0.254 mm).

Models: ACE DuraFlo® Systems ADF-204 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. ADF-204 is composed of 100 percent solids, two-component epoxy (1:1 by volume) which meets the requirements of NSF 61 Section 5. The ePIPE™ System is recognized for application on either galvanized steel pipe or copper tube from $\frac{1}{2}$ inch to 4 inches (12.7 to 101.6 mm) in diameter. The installed minimum thickness of the coating must be 0.004 inch (0.10 mm) on all sizes. The average coating thickness must not exceed 0.010 inch (0.254 mm) on $\frac{1}{2}$ -inch-diameter galvanized steel pipe and copper tube, or 0.014 inch (0.356 mm) on larger pipe and tube. 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.

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 rigid copper tubing or galvanized steel pipe materials in accordance with the applicable code.
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.

**TABLE 1—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER),
1/2-INCH COPPER TUBING, ASTM B88 WITH 10-MIL ACE DURAFLO® COATING**

Flow Rate (gpm)	Type M ID= 0.549		Type L ID= 0.525		Type K ID= 0.507	
	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
1.00	1.36	0.59	1.48	0.74	1.59	0.88
2.00	2.71	2.38	2.96	2.97	3.18	3.54
3.00	4.07	5.35	4.45	6.69	4.77	7.96
4.00	5.42	9.51	5.93	11.89	6.36	14.16
5.00	6.78	14.86	7.41	18.58	7.95	22.12
6.00	8.13	21.40	8.89	26.76	9.54	31.86
7.00	9.49	29.12	10.37	36.42	11.12	43.36
8.00	10.84	38.04	11.86	47.57	12.71	56.63
9.00	12.20	48.14	13.34	60.20	14.30	71.67
10.00	13.55	59.44	14.82	74.32	15.89	88.49
11.00	14.91	71.92	16.30	89.93	17.48	107.07
12.00	16.26	85.59	17.78	107.02	19.07	127.42
13.00	17.62	100.45	19.27	125.61	20.66	149.54
14.00	18.97	116.50	20.75	145.67	22.25	173.43
15.00	20.33	133.73	22.23	167.23	23.84	199.10
16.00	21.69	152.16	23.71	190.27	25.43	226.53
17.00	23.04	171.77	25.20	214.79	27.02	255.73
18.00	24.40	192.58	26.68	240.81	28.61	286.70

**TABLE 2—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER),
3/4-INCH COPPER TUBING, ASTM B88 WITH 10-MIL ACE DURAFLO® COATING**

Flow Rate (gpm)	Type M ID= 0.791		Type L ID= 0.765		Type K ID= 0.725	
	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')	Velocity (ft/sec)	Press Loss (psi/100')
1.00	0.65	0.09	0.70	0.11	0.78	0.14
2.00	1.31	0.37	1.40	0.43	1.55	0.57
3.00	1.96	0.82	2.09	0.97	2.33	1.27
4.00	2.61	1.46	2.79	1.73	3.11	2.26
5.00	3.26	2.28	3.49	2.70	3.89	3.53
6.00	3.92	3.29	4.19	3.89	4.66	5.09
7.00	4.57	4.48	4.89	5.29	5.44	6.92
8.00	5.22	5.85	5.58	6.91	6.22	9.04
9.00	5.88	7.40	6.28	8.75	6.99	11.44
10.00	6.53	9.14	6.98	10.80	7.77	14.13
11.00	7.18	11.06	7.68	13.07	8.55	17.09
12.00	7.83	13.16	8.38	15.55	9.33	20.34
13.00	8.49	15.44	9.07	18.25	10.10	23.87
14.00	9.14	17.91	9.77	21.17	10.88	27.69
15.00	9.79	20.56	10.47	24.30	11.66	31.78
16.00	10.45	23.39	11.17	27.65	12.43	36.16
17.00	11.10	26.41	11.87	31.21	13.21	40.83
18.00	11.75	29.61	12.56	34.99	13.99	45.77
19.00	12.40	32.99	13.26	38.99	14.77	51.00
20.00	13.06	36.55	13.96	43.20	15.54	56.51

**TABLE 2—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER)
³/₄-INCH COPPER TUBING, ASTM B88 WITH 10-MIL ACE DURAFLO[®] COATING (Continued)**

21.00	13.71	40.30	14.66	47.63	16.32	62.30
22.00	14.36	44.23	15.36	52.27	17.10	68.37
23.00	15.02	48.34	16.05	57.13	17.87	74.73
24.00	15.67	52.63	16.75	62.21	18.65	81.37
25.00	16.32	57.11	17.45	67.50	19.43	88.29
26.00	16.97	61.77	18.15	73.01	20.21	95.50
27.00	17.63	66.61	18.85	78.73	20.98	102.98
28.00	18.28	71.64	19.54	84.67	21.76	110.75
29.00	18.93	76.85	20.24	90.83	22.54	118.80
30.00	19.59	82.24	20.94	97.20	23.31	127.14
31.00	20.24	87.81	21.64	103.79	24.09	135.76
32.00	20.89	93.57	22.34	110.59	24.87	144.66
33.00	21.55	99.51	23.03	117.61	25.65	153.84

**TABLE 3—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 (gpm)	¹ / ₂ " ID= 0.602		³ / ₄ " ID= 0.804		1" ID= 1.029	
	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 4—FLOW RATE, VELOCITY, AND FRICTION LOSS (WATER),
1¹/₄-INCH, 1¹/₂-INCH AND 2-INCH GALVANIZED STEEL PIPE, ASTM A53 WITH 10-MIL
ACE DURAFLO COATING**

Flow Rate (gpm)	1 ¹ / ₄ " ID= 1.360		1 ¹ / ₂ " ID= 1.590		2" ID= 2.047	
	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—ePIPE LOGO

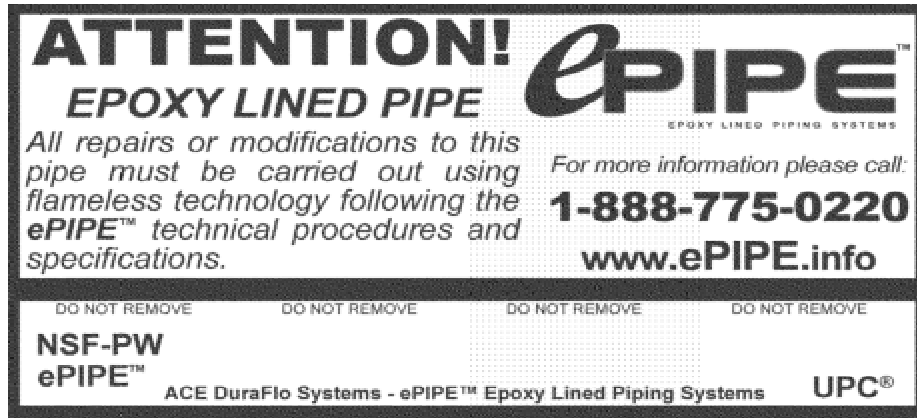


FIGURE 2—COATED PIPE LABEL