

ICC-ES PMG Listing**PMG-1009***Effective Date: October 1, 2011**This listing is subject to re-examination in one year.*

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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 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
 3122 West Alpine Street
 Santa Ana, California 92704
 www.aceduraflo.com

Compliance with the following codes:

2012, and 2009 *International Plumbing Code*® (IPC)
2012, and 2009 *International Residential Code*® (IRC)

Compliance with the following standards:

ASTM F 2831 Standard Practice for Internal Non Structural Epoxy Barrier Coating Material Used In Rehabilitation of Metallic Pressurized Piping Systems

LC1008, Listing Criteria for Internal Epoxy Barrier Pipe Coating Material for Water Supply Systems

ASTM D 4541, Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers

NSF 61, Section 5, Drinking Water System Components – Health Effects

AWWA C210, Liquid-Epoxy Coating System for the Interior and Exterior of Steel Water Pipe Lines

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.

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 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 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.
4. The ePIPE[®] Epoxy Lined Piping System is manufactured in Stockton, CA, under a quality control program with annual surveillance inspections by NSF (AA-633).

**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



Epoxy - Barrier Coating


Non-Toxic
 Part **A** Coating

For Professional Application Only.

Zero VOC


Net Contents: One U.S. Gallon (3.785 Liters)



Material Supplied As A Unit.
Mix All Of A Component with All Of B Component.



KEEP FROM FREEZING

ACE DuraFlo Systems, LLC, 3122 West Alpine Street, Santa Ana, California, 92704 • 1.888.775.0220 • www.epipeinfo.com



Epoxy - Barrier Coating

Non-Toxic
 Part **B** Coating

For Professional Application Only.

Zero VOC


Net Contents: One U.S. Gallon (3.785 Liters)

Material Supplied As A Unit.
Mix All Of A Component with All Of B Component.

KEEP FROM FREEZING

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Figure 1 – Epoxy Canister Label



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