C13.06 on Manholes and Specials. Current edition approved Aug. 15, 1993. Published October 1993.
(2) Annual Book of ASTM Standards Vol. 04.05.

4. Summary of Practice

4.1 All lift holes and any pipes entering the manhole are to be plugged. A vacuum will be drawn and the vacuum drop over a specified time period is used to determine the acceptability of the manhole.

5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the manhole being tested and at the time of testing.

6. Preparation of the Manhole

6.1 All lift holes shall be plugged.

6.2 All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.

7. Procedure

7.1 The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.

7.2 A vacuum of 10 in. of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 in of mercury.

7.3 The manhole shall pass if the time for the vacuum reading to drop from 10 in. of mercury to 9 in. of mercury meets or exceeds the values indicated in Table 9.1.

7.4 If the manhole fails the initial test, necessary repairs shall be made by an approved method. The manhole shall then be retested until a satisfactory test is obtained.

7.5 Use or failure of this vacuum test shall not preclude acceptance by appropriate water infiltration or exfiltration testing, (see practice C9690, or other means).

8. Precision and Bias

8.2 No justifiable statement can be made either on the precision or bias of this procedure, since the test result merely states whether there is conformance to the criteria for the success specified.

9. Keywords

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9.1 Acceptance criteria: Concrete; manhole sections; test method; vacuum test.

TABLE 9-1
Minimum Test Times for Various Manhole Diameters
(seconds)

Depth (feet)	Diameter (Inches)							
	30	33	36	42	48	54	60	66	72
8	11	12	14	17	20	23	26	29	33
1 0	14	15	18	21	25	29	33	36	41
1 2	17	18	21	25	30	35	39	43	49
1 4	20	21	25	30	35	41	46	51	57
1 6	22	24	29	34	40	46	52	58	67
1 8	25	27	32	38	45	52	59	65	73
2 0	28	30	35	42	50	53	65	72	81
2 2	31	33	39	46	55	64	72	79	89
2 4	33	36	42	51	59	64	78	87	97
2 6	36	39	46	55	64	75	85	94	105
2 8	39	42	49	59	69	81	91	101	113
3 0	42	45	53	63	74	87	98	108	121

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9.05 CLOSED CIRCUIT TELEVISION INSPECTION

When Mandrel Test shows areas of deflection failure along the pipe or when air testing fails, the Contractor shall be required to perform a closed circuit television inspection of the sanitary sewer between manholes as follows:

A. A camera equipped with a rotating lens and remote control devices to adjust the light intensity and one thousand (1,000) lineal feet of sewer cable shall be provided. The camera should be able to transmit a continuous image to the television monitor as it is being pulled through the pipe. The image shall be clear enough to enable the District representative and others viewing the monitor to easily evaluate the interior condition of the pipe. The camera shall have a digital display for lineal footage and project number and an audio voice-over shall be made during the inspection identifying any problems.

B. The pipe shall be thoroughly cleaned before the camera is installed and televising is commenced.

C. The VHS tape of the entire sewer line and reproduction map indicating the pipe segment numbers of all the pipe that has been televised shall be submitted to the District for their records.

If any pipe and/or joint is found to be leaking, the Contractor shall be required to repair that portion of the pipe to the satisfaction and approval of the District.

D. FCRWD will perform a closed circuit television inspection of all new sanitary sewer lines prior to final acceptance by the District. Any deficiencies noted must be repaired and re-televised by the Contractor before final acceptance by the District.

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Table 9-2
(9-Arm Mandrel)
Dimensions for ASTM D3034 SDR 35 PVC Pipe

Nominal Diameter	Length	Deflection	
		3%	5%
8	8	7.71	7.56
10	10	9.63	9.45
12	12	11.46	11.26
15	12	14.03	13.78

(10-Arm Mandrel)
Dimensions for ASTM D3034 SDR 35 PVC Pipe

Nominal Diameter	Length	Deflection	
		3%	5%
8	8	7.72	7.58
10	10	9.65	9.48
12	12	11.48	11.29
15	12	14.06	13.82

EXAMPLE LOW PRESSURE AIR TESTS

A. GENERAL

The purpose of this Section is to illustrate the proper application of this recommended practice with regard to appropriate test time selection. The examples that follow include a variety of conditions which may be encountered in the field.

1. EXAMPLE A

A manhole to manhole reach of nominal 12-inch pipe is 350 feet long. No lateral connections exist in the reach. What is the required test time for a 0.5 psig pressure drop?

Solution: The required test time can be read directly from Table 9.1B. For 350 feet of 12-inch pipe, the required test time is 9:58 (9 minutes and 58 Seconds).

2. EXAMPLE B

A 350 foot section of nominal 12-inch pipe is ready for testing. A total of 128 feet of 4-inch lateral sewer pipe is connected to the 350 foot section and will be included in the test. What will be the required test time for a 0.5 psig pressure drop?

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Solution: Lateral sewers may be disregarded when selecting test times. Therefore, the required test time will be the same as for Example A, i.e. 9 minutes and 58 seconds.

Note: If lateral sewers had not been disregarded, the required test time would be 10 minutes and 22 seconds, i.e. only 24 seconds longer.

3. EXAMPLE C

What should the required test time for a 1.0 psig pressure drop in 327 feet of nominal 8-inch diameter pipe between two manholes?

Solution: The exact test time is easily calculated by using Table 9.1A. Table 9.1A is used because a 1.0 psig pressure drop is specified. Since 327 feet exceeds the minimum test time for an 8-inch pipeline, the fourth column in Table 9.1A shall be used to quickly calculate the required test time as follows:

T = 1.520   L = 1.52 X 327 = 497 seconds

Therefore, the required test time for a 1.0 psig pressure drop is 497 seconds, or 8 minutes and 17 seconds.

4. EXAMPLE D

A manhole to manhole reach of nominal 24-inch pipe is 82 feet long. What is the required test time for a 0.5 psig pressure drop?

Solution: Table 9.1B must be used because a 0.5 psig pressure drop is specified. Since 82 feet is less than the 99 foot length associated with the minimum test for a 24-inch pipeline, the minimum test time shall apply. Thus, the required test time for a 0.5 psig pressure drop must be 11:20 (11 minutes and 20 seconds).

5. EXAMPLE E

A 412 foot section of nominal 15-inch sewer pipe has been readied for air testing. A total of 375 feet of nominal 6-inch piping and 148 feet of nominal 4-inch lateral piping branch off of the 15-inch sewer line. All laterals have been capped and/or plugged and will be tested together with the 15-inch main line. The specified pressure drop which will be timed is 0.5 psig. What is the appropriate test time for this pipe network?

Solution: All lateral sewer sizes and lengths may be disregarded since their influence is generally not significant enough to warrant computation. Table 9.1B must be used for a

0.5 psig pressure drop. The fourth column in the Table provides the appropriate formula for calculating the required test time 412 feet is longer than the third column value of 159 feet.

T = 2.671 L = 2.671 X 412 - 1, 100 seconds

The required test time is 1,100 seconds or 18 minutes and 20 seconds.

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SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q= 0.0015

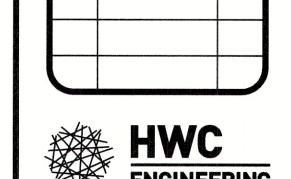| 1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.036 L	28:51	43:16	57:41	72:07	86:32	100:47	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

Table 9.1A

SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q= 0.0015

1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:27	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:06	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

Table 9.1B

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CONTRACTOR SHALL ADHERE AND REFERENCE THE CURRENT FALL CREEK REGIONAL WASTE DISTRICT STANDARDS FOR DESIGN AND CONSTRUCTION OF SANITARY SEWERS.

MAPLE TRAILS
SECTION 4

FCRWD SANITARY SPECIFICATIONS

KRISTOPHER K. EICHHORN
No. 11400758
STATE OF INDIANA
REGISTERED PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION

DRAWN BY	TD/TS/GM
CHECKED BY	KE
DATE	APRIL 16, 2020
SCALE	N/A

JOB NUMBER 2017-096-D

SHEET

C8.8

FCRWD SANITARY SPECIFICATIONS

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