CLARK COUNTY FIRE DEPARTMENT
Fire Prevention Bureau
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105.8.f.2

TITLE: **HYDRANT FLOW TEST FOR FIRE SPRINKLER DESIGN**

SCOPE: Flowing of fire hydrants for establishing water supply for design of fire sprinkler systems shall be performed in accordance with this guideline and the 2005 Clark County Fire Code.

PURPOSE: To standardize fire department requirements relating to flow testing of fire hydrants for fire sprinkler design**.**

SPECIFICATIONS AND REQUIREMENTS:

All fire sprinkler submittals utilizing city water supply in hydraulic calculations shall be preceded by a hydrant flow test for fire sprinkler design. Such hydrant flow test shall be conducted within a maximum of 12 months prior to the date of fire sprinkler system submittal.

At the time of permit application, three (3) sets of plans, drawn to an indicated scale, must be submitted for review and approval. The standard permit fee is due upon submittal. Please see the **Clark County Fire Department Permit and Service Fee Schedule** for specific information. Please check our website for plan status. Any additional fees will be indicated on the website. Once the plans have been approved and any outstanding fees have been paid, an inspection can be scheduled.

Our website is http://www.accessclarkcounty.com/fire/firedept.htm. To check on plan status, click on the "Plan Status" button and follow the instructions. To schedule an inspection, click on "Services" in the teal strip on the top. On the left side under **Inspection,** click on "Fire Inspection" and follow the instructions.

PLANS:

The following must be included when submitting for a flow test for fire sprinkler design:

1. Permit application. Indicate the permit is for "Fire Sprinkler Design Flow Test"
2. Minimum of two copies of the most recently approved civil plans for the project with CCFD signature and approval date. Civil plans must show the following:
    a. Location of Building/project
    b. Hydrants identified and labeled the "Gauge Hydrant" and the "Flow Hydrant". The Flow Hydrant must be hydraulically remote from the water supply, and the Gauge Hydrant must be hydraulically closer to the water supply. On-site fire hydrants shall be used where available.

c. Hydrants identified and labeled “Gauge Hydrant” and “Flow Hydrant” within 1,000 feet of the Building/project.

Upon approval, CCFD will apply a second stamp to the civil plans for use during the field hydrant flow test. CCFD will keep one copy, and return the second copy to the contractor. The contractor must ensure that their copy of the approved plan is shown to the inspector at the time of the hydrant flow test. The hydrant flow test will follow the attached “Hydrant Flow Inspection Procedure Checklist”.

Contractor must ensure the test is conducted in a safe manner. Precautions must be taken to ensure that no property is damaged as a result of the test.

On the site, the contractor must provide static gauge(s), pitot gauge(s) and hydrant wrench(es). Gauges shall have a calibration certificate verifying that calibration of the gauges has occurred a maximum of 12 months prior to the hydrant flow test date. It is the responsibility of the contractor to connect gauges, open hydrants, and handle pitot gauge equipment. A diffuser is required when flow test is being conducted adjacent to a street with a high degree of traffic or when damage to landscape could occur. Inspection staff is only responsible for witnessing the test and recording information.

HYDRANT FLOW INSPECTION PROCEDURE CHECKLIST

1. Verify permit and approved plans.
2. At the site, identify the 2 fire hydrants used for the test, as described on the approved plans
3. Witness the contractor putting a pressure gauge on the gauge hydrant.
4. Witness the contractor opening the gauge hydrant to determine the static pressure. Verify that air is relieved from the gauge by flowing water through the petcock valve.
5. Record the static pressure on the F-35.
6. Have the contractor open the flow hydrant. It is preferable to use one or both of the 2.5-inch outlets, keeping in mind the need to have sufficient pressure drop at the gauge hydrant. If the 4-inch outlet needs to be used to achieve pressure drop, it is acceptable to use the 4-inch outlet.
7. When flow has stabilized, observe the residual pressure at the gauge hydrant. The pressure drop must be at least 10 psi or 25% of the static pressure, whichever is less. (Note: NFPA 291 requires a minimum drop of 25%, but that is simply not practical for most tests. A 10-psi drop should be sufficient to allow a reasonable curve to be drawn). EXCEPTION: If all outlets of the flow hydrant, including the 4-inch outlet and both 2.5 inch outlets, are opened and the pressure drop does not exceed 10 psi, then simply record the residual pressure with this full flow situation, even if the drop is less than 10 psi.
8. Record the residual pressure on the F-35
9. Go to the flow hydrant and record the number and size of outlets flowed on the F-35
10. For each outlet, observe the contractor taking a pitot reading. For handheld pitots, the pitot tube needs to be held away from the outlet a distance equal to one-half the diameter of the outlet. For fixed systems such as HoseMonster systems,

utilize the fixed pitot or pressure measuring devices within the equipment to determine pitot pressure.

11. Record the pitot pressure reading for each outlet on the F-35.
12. Use the attached chart to determine the flow out of each outlet. For fixed systems such as HoseMonster, utilize the manufacturer pressure charts.
13. Record the flow from the attached chart or the flow from the manufacturer chart directly to the F-35. No additional analysis is required.
14. The minimum information to be provided on the F-35 is the site address, the static gauge pressure, the residual gauge pressure, the pitot pressure, the orifice size, and the resulting flow(s) (See attached example).
15. Input into Prod Plans the static gauge pressure, the residual gauge pressure, the pitot pressure, the orifice size, and the resulting flow.

Pitot Pressure* (PSI)	Orifice Size (in.)		Pitot Pressure* (PSI)	Orifice Size (in.)	
	2.5	4		2.5	4
1	168.3	416.4	42	1088.1	2311.2
2	237.6	589.3	44	1113.3	2365.7
3	290.7	684.8	46	1138.5	2418.8
4	335.7	765.0	48	1162.8	2471.1
5	375.3	826.6	50	1187.1	2521.9
6	411.3	883.8	52	1210.5	2571.9
7	443.7	943.5	54	1233.0	2620.5
8	475.2	1008.5	56	1256.4	2669.0
9	504.0	1069.7	58	1278.0	2716.1
10	531.0	1128.0	60	1300.5	2762.4
11	557.1	1182.5	62	1322.1	2808.0
12	581.4	1235.5	64	1342.8	2853.5
13	604.8	1285.6	66	1363.5	2897.6
14	628.2	1334.1	68	1384.2	2940.9
15	649.8	1381.2	70	1404.0	2984.3
16	671.4	1426.8	72	1424.7	3026.1
17	692.1	1470.8	74	1443.6	3067.9
18	711.9	1513.4	76	1463.4	3109.0
19	731.7	1554.5	78	1482.3	3150.1
20	750.6	1594.8	80	1501.2	3189.7
22	787.5	1672.5	82	1520.1	3229.3
24	822.6	1747.2	84	1538.1	3268.9
26	855.9	1818.2	86	1557.0	3307.7
28	888.3	1886.9	88	1575.0	3345.8
30	919.8	1953.4	90	1592.1	3383.2
32	949.5	2017.6	92	1610.1	3420.5
34	978.3	2079.6	94	1627.2	3457.9
36	1007.1	2140.2	96	1644.3	3494.5
38	1035.0	2198.4	98	1661.4	3530.3
40	1062.0	2255.9	100	1678.5	3566.2

2.5” flows: $Q=29.84cd^2\sqrt{p}$ with c = .9

4” flows: use coefficient .9 and the figures from this Table 4.8.2 from NFPA 291:

Pitot Pressure (Velocity Head)	
Psi	Coefficient
2	0.97
3	0.92
4	0.89
5	0.86
6	0.84
7 and over	0.83