NFPA 1142 Chapter 8

8.1 * General.
The AHJ shall ensure that generally accepted design practices are employed during the following:

1. (1)Dry hydrant location planning
2. (2)The permit process
3. (3)Design criteria
4. (4)Construction

8.2 Planning and Permits.
The planning, permitting, and design processes shall be completed before the actual construction begins.

8.2.1
Planning shall be coordinated among public and private entities that could be impacted by the installation of a dry hydrant.

8.2.2 *
Required permits to install a dry hydrant shall be obtained prior to installation.

A.8.2.2
Permits to install a dry hydrant should be obtained from the AHJ. These can include local, state, and federal agencies charged with fire protection, zoning, water, environmental protection, agriculture and resource conservation, among others.

8.3 * Dry Hydrant Design.

8.3.1 *
The AHJ shall approve all aspects of the dry hydrant design and construction, including the type of materials, pipe size, and system fittings to be used.

A.8.3.1

Factors including local topography, climatic conditions, and access to materials will determine the design characteristics of each installation. Distance to the water combined with the difference in elevation between the hydrant head and the water source, and the desired flow, in gpm (L/min) will affect the pipe size that should be used.

Local preferences and experience, along with access to materials, will determine the type of pipe and fittings best suited for the job. In some parts of the country, brass and bronze caps and suction hose connections, along with iron, steel, and bituminous cement pipe and fittings, are being used for dry hydrant installations.

A.8.3
Since there might be resources available to assist in the planning and installation of dry hydrants, it is desirable to identify and consult with the persons responsible for those resources early in the process.

8.3.2 *
As a minimum, Schedule 40 pipe and component fittings shall be used.

A.8.3.2
Many fire service hose appliance manufacturers now offer pre-manufactured and pre-assembled PVC suction screens, hydrant heads, and supports that come ready to attach to the pipe *[see Figure A.8.3.2(a)]*.

Figure A.8.3.2(b) is an example of a dry hydrant installation showing a minimum 6 in. (150 mm) pipe and screen. Installations can involve larger pipes and screens.

Figure A.8.3.2(a) Commercially Available Dry Hydrant Components.

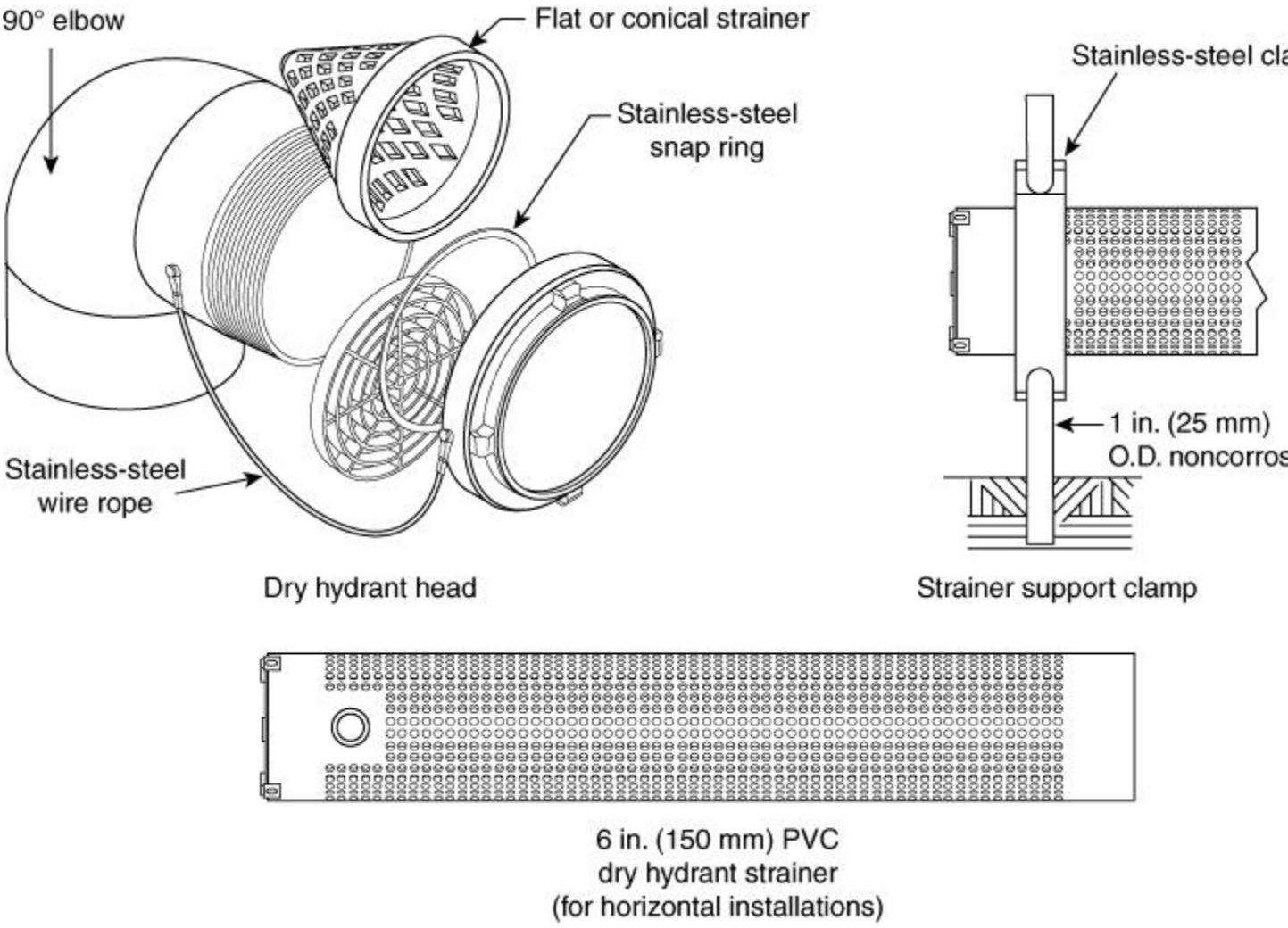
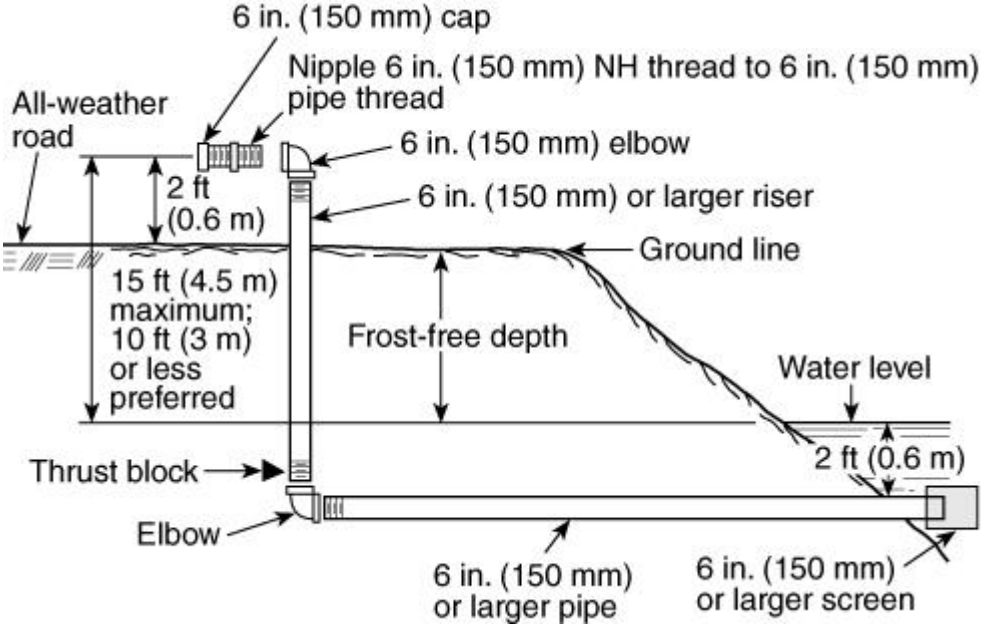


Figure A.8.3.2(b) Exploded View of Dry Hydrant Construction.



8.3.3 *
All dry hydrant systems shall be designed and constructed to provide a minimum flow of 1000 gpm (3800 L/min) at draft.

A.8.3.3
System design requirements should allow for required fire flow, atmospheric pressure, lift, vapor pressure, length of required pipe run, coefficient of materials (C factor), piping configuration, and other design factors that approved engineering practices would necessitate.

The following are some factors that should be considered when a dry hydrant system is designed:

(1) Lift should be as low as possible and not exceed 10 ft to 12 ft (3.1 m to 3.7 m), if possible. This loss cannot be overcome by enlarging the pipe size.

(2) Total head loss should not exceed 20 ft (6.1 m), or the pump might not supply its rated gpm (L/min). If the fire department will be using portable pumps on the dry hydrant, those pumps generally have less capability to create a vacuum and head loss needs to be as low as possible.

8.3.4 *
The water supply source for the dry hydrant shall provide, on a year-round basis, the required quantity of water, as determined in Chapter 4, and the minimum flow as required in 8.3.3.

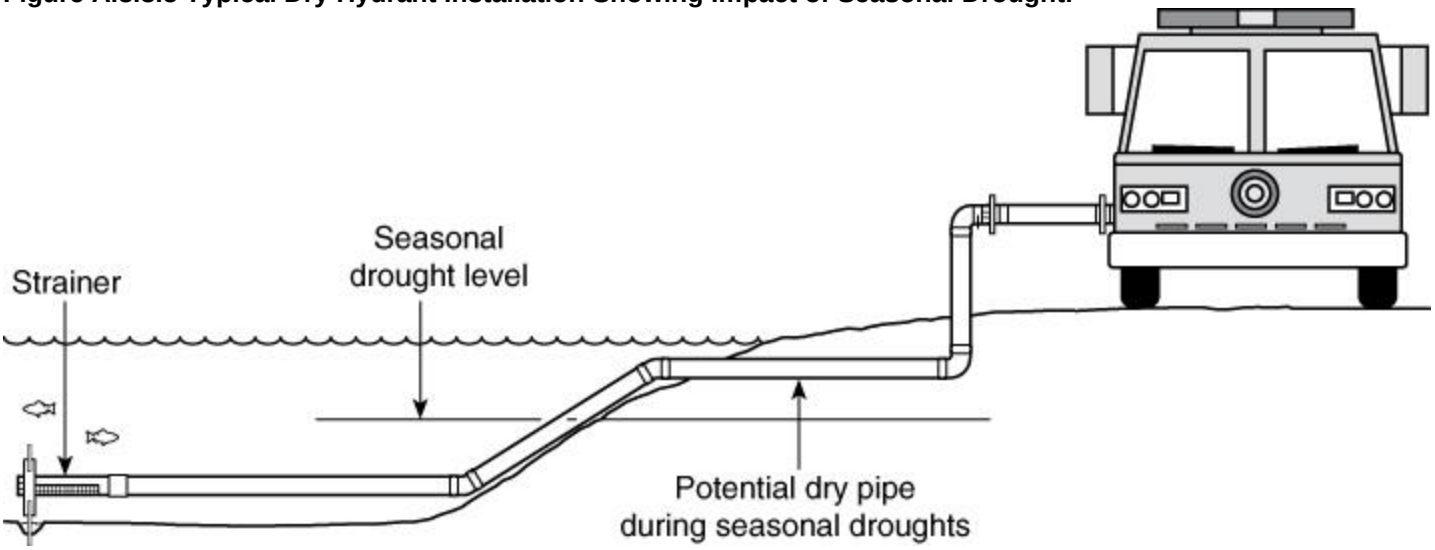
A.8.3.4
The required flow at the dry hydrant can exceed the delivery flow shown in Chapter 4 to allow for rapidly filling mobile water supply fire apparatus.

8.3.5 *
Dry hydrant systems shall be designed and constructed so that slope and piping configurations do not impede drafting capability.

A.8.3.5
See Annex I for information on dry hydrant design.

Figure A.8.3.5 shows a typical dry hydrant installation where freezing is not a concern. During seasonal droughts, more of the pipe will be empty, requiring the primer on the pump to be operated longer before water reaches the pump.

Figure A.8.3.5 Typical Dry Hydrant Installation Showing Impact of Seasonal Drought.



8.3.6 *
All exposed surfaces and all underground metal surfaces shall be protected to prevent deterioration.

A.8.3.6
Metal piping and exposed PVC pipe surfaces should be primed and painted to prevent deterioration.

8.3.7 *
A minimum number of elbows shall be used in the piping system.

A.8.3.7
Preferably no more than two 90-degree elbows should be used. It might be desirable to have a wide-sweep elbow [using two 45-degree elbows and a 2 ft (0.6 m) length of pipe] installed at the bottom of the riser where the lateral run connects. In the event of a broken-off hydrant connection, this could permit sections of 2½ in. (65 mm) suction hose to be inserted down the 6 in. (150 mm) pipe to the water and would permit drafting to continue, although at a much reduced rate of flow.

8.3.8
Suction hose connection(s) shall be compatible with the fire department's hard suction hose size and shall conform to NFPA 1963. The connection(s) shall include a protective cap. The cap and adapter shall be of materials that minimize rust and galvanic corrosion.

8.3.9
Dry hydrant system piping shall be supported and/or stabilized using approved engineering design practices.

8.3.10
Stabilization or equivalent protection shall be employed at elbows and other system stress points.

8.3.11
In addition to strength of materials and structural support criteria, design shall specify appropriate aggregates and soil materials to be used to backfill/cover piping during installation.

8.3.12
All connections shall be clean, and the appropriate sealing materials shall be used according to manufacturer's specifications so as to ensure that all joints are airtight.

8.3.13 *
System strainers shall be constructed to permit required fire flow.

A.8.3.13
Strainers or screens have been locally fabricated by drilling sufficient ⅜ in. (10 mm) holes in a length of pipe to equal 4 times the cross-sectional area of the pipe and capping the end with a removable or hinged cover. Remember to leave a solid strip of pipe approximately 4 in. to 5 in. (100 mm to 125 mm) wide along the top to act as a baffle to prevent whirlpooling during periods of low water.

8.4 * Dry Hydrant Locations.

8.4.1
A minimum of 3 ft (0.9144 m) of clear, unobstructed space shall be provided around the dry hydrant.

8.4.2 *
Dry hydrants shall be located so that they are accessible under all weather conditions.

A.8.4.2

It is the responsibility of the AHJ to make inspections of all water sources as often as conditions warrant to note any changes and take appropriate action. This is particularly true during adverse weather conditions, such as droughts, very wet periods, heavy freezing, and following snowstorms.

8.4.3
The dry hydrant system and access to the site shall be developed in a manner that allows the fire department pump to connect to the hydrant using not more than 20 ft (6 m) of hard suction hose.

8.4.4
Dry hydrants shall be located a minimum of 100 ft (30 m) from any structure.

8.4.5
No parking or other obstacles shall be allowed within 20 ft (6 m) of the access side of the hydrant.

8.4.6 *
Dry hydrants shall be protected from damage by vehicular and other perils, including freezing and damage from ice and other objects.

8.4.7 *
Dry hydrant locations shall be made visible from the main roadway during emergencies by reflective marking and signage approved by the AHJ.

8.4.8
All identification signs shall be approved by the highway authority prior to installation if they are to be located on the right-of-way or are subject to state laws.

8.5 * Depth of Water Sources.

A.8.5
The installation of dry hydrants calls for care in measuring water storage capacities. The useful depth of a lake with a dry hydrant installation, for instance, is from the minimum foreseeable low-water surface level to the top of the suction strainer, not to the bottom of the lake, and cannot be less than 2 ft (0.6 m) of water. This becomes a very important point where hydrants are installed on a body of water affected by tide, or on a lake that is lowered to maintain the flow of a river during drought conditions, to generate power, or that freezes over. Pump suction requires submergence below the water surface of 2 ft (0.6 m) or more, depending on the rate of pumping, to prevent the formation of a vortex or whirlpool. Baffle and anti-swirl plates should be added to minimize vortex problems and allow additional water use. The vortex allows air to enter the pump, which can cause the loss of the pump prime. Therefore, pumping rates should be adjusted as the water level is lowered. This factor should be considered by the WSO when estimating the effective rate at which water can be drawn from all suction supplies.

In water sources where heavy sediment and silt could present a problem of clogged suction screens, the intake screens should be raised above the bottom. Figure A.8.5(a) and Figure A.8.5(b) show two examples of how the strainer can be kept out of mud and silt conditions.

Figure A.8.5(a) Offset Screen Installation for Silt and Mud Conditions.

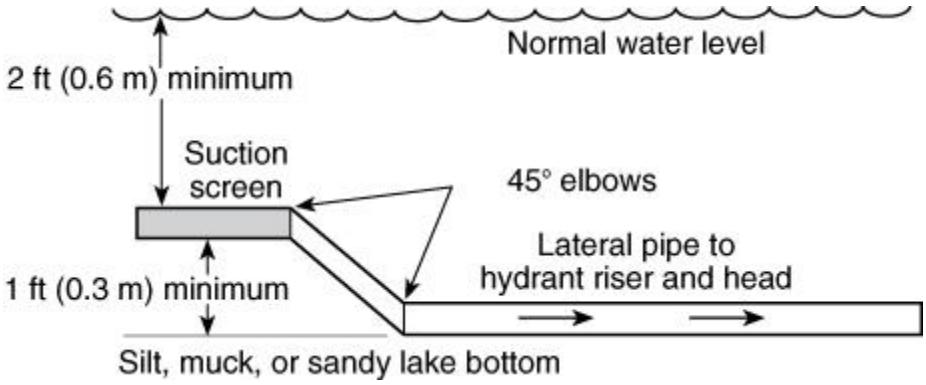
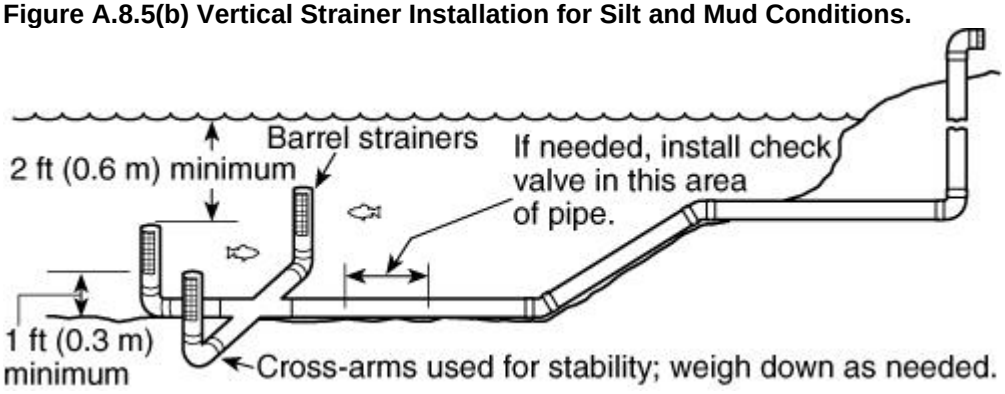


Figure A.8.5(b) Vertical Strainer Installation for Silt and Mud Conditions.



8.5.1
There shall be not less than 2 ft (0.6 m) of water above the strainer and not less than 1 ft (0.3 m) below the strainer.

8.5.2
Depth of the water shall be based on the 50-year drought level for the water source.

8.6 * Installation Procedure for Dry Hydrant System.
The AHJ shall ensure that the installation meets all design criteria.

A.8.6
A typical installation process includes the need to excavate or trench soil that might be somewhat unstable and which is often on sloping terrain. Only persons with experience and proper equipment to install underground piping should endeavor to install dry hydrant systems.

8.7 Inspection and Maintenance of Dry Hydrants.

8.7.1 *
Dry hydrants shall be inspected at least quarterly and maintained as necessary to keep them in good operating condition.

8.7.2
Thorough surveys shall be conducted, to reveal any deterioration in the water supply situation in ponds, streams, or cisterns.

8.7.3
Vegetation shall be cleared for a minimum 3 ft (0.9 m) radius from around hydrants.

8.7.4
The reflective material marking the hydrant and signage shall be inspected at least annually to verify that it is being maintained in accordance with 8.4.7.

8.7.5
Hydrant risers shall be protected from ultraviolet (UV) degradation by painting or other measures.

8.7.6 *
The hydrants shall be flow tested at least annually with an approved pump to ensure that the minimum design flow is maintained.

8.8 * Records for Dry Hydrants.
The AHJ shall maintain, in a safe location, maps and records of each dry hydrant installation and the subsequent tests, inspections, maintenance, and repairs to the dry hydrant.