

FIRE SUPPRESSION RATING SCHEDULE

Virtually all U.S. insurers of homes and business property use ISO's Public Protection Classifications (PPC™) when calculating premiums. In general, the price of fire insurance in a community with a good PPC is substantially lower than in a community with a poor PPC, assuming all other factors are equal. ISO's PPC program evaluates communities according to a uniform set of criteria known as the Fire Suppression Rating Schedule (FSRS). The FSRS has three main parts — Fire Alarm and Communications (10%), the Fire Department (50%), and Water Supply (40%) — which reference nationally, recognized standards developed by the National Fire Protection Association and the American Water Works Association. For your information, we are providing you with the appropriate subsection of the FSRS that focuses on Water Supply.

SECTION I: PUBLIC FIRE SUPPRESSION

600. WATER SUPPLY

WATER SUPPLY

600. GENERAL:

This item reviews the water supply system that is available for fire suppression in the city.

601. PART OF CITY UNPROTECTED:

If any built-on area of the city is not within 1,000 feet of a recognized water system, the unprotected area may receive Class 9 (See Items 801 and 802).

602. MAXIMUM DAILY CONSUMPTION RATE (MDC):

The maximum daily consumption rate is the average rate of consumption on the maximum day. The maximum day is the 24-hour period during which the highest consumption total is recorded in the latest 3-year period. High consumption that will not occur again due to changes in the system, or that was caused by unusual operations, will not be considered.

When no actual figure for maximum daily consumption is available, it will be estimated on the basis of consumption in other cities of similar character and climate. Such estimates will be at least 50 percent greater than the average daily consumption. When a system is in 2 or more service levels, consider the total maximum daily consumption that must pass through the service level being reviewed.

603. MINIMUM PRESSURE:

A water system is reviewed at a residual water pressure of 20 psi.

604. FIRE FLOW AND DURATION:

The fire flow duration should be 2 hours for Needed Fire Flows (NFF_i) up to 2,500 gpm, and 3 hours for Needed Fire Flows of 3,000 and 3,500 gpm.

605. SERVICE LEVEL:

A service level is a part of the city distribution system that is served by one or more sources of supply but that is separated from the remaining distribution system by closed valves, check valves or pressure regulating equipment, or is not connected.

When a system is supplied from 2 or more sources or supply works, the credit shall be based upon the combined protection provided from all sources or supply works.

610. REVIEW OF SUPPLY SYSTEM:

The ability of the water supply system to deliver the Needed Fire Flow (NFF_i) at representative locations throughout the city is reviewed in Items 611 through 616. For each representative location, the supply works, mains, and hydrant distribution are reviewed separately.

611. SUPPLY WORKS:

The absolute minimum supply available from water sources under extreme dry weather conditions should not be taken as the measure of the normal ability of the source of supply. The normal sustained flow of supplies should be used as the normal capacity of the source. If the supply is regularly reduced for a period exceeding one month per year, prorate the available supply by the time available.

A. Minimum Storage (MS_i):

The average daily minimum water storage maintained is the maximum amount that can be credited. For storage floating on the distribution system, only the portion of average daily minimum storage that can be delivered at the required residual pressure, and for the fire duration at the point of use, shall be credited. (MS) is the sum of all these storages (MS = ΣMS_i) available at the test location for the fire duration, expressed in gpm.

For ground or below-ground storage, where the average daily minimum storage must be repumped, the storage is credited, or is limited by pumps under PUI according to the capacity of the pumping facility for the fire duration.

When a city experiences large seasonal fluctuations of population and therefore wide variations in consumption, the average daily minimum storage will be considered at the time when consumption is average for the maximum population.

B. Pumps (PU_i):

Pumps should be credited at their effective capacities when delivering at normal operating pressures. The effective capacity may be limited by filters, softeners, or other devices in suction or discharge lines, and, when pumping stored water their effective capacity may be limited by the average minimum daily storage. The total pumping capacity (PU) shall be the sum of all pump facilities ($PU = \sum PU_i$) available at the test location, expressed in gpm.

When there are 2 or more pump lifts in series, the effective pump capacity is the capacity of the lift with the lowest total capacity.

When the same pumps can operate in 2 or more lifts, they shall be credited in each lift to determine the lift with the lowest total capacity.

C. Filters (FL_i):

Filters may be considered as capable of operating at a reasonable overload capacity based on records. When filters limit the capacity of subsequent pumping stages, consider them as a pump capacity limit (PU_i). When filters deliver water directly into the distribution system, without pumping, the total filter capacity (FL) shall be the sum of all filter capacities ($FL = \sum FL_i$) available at the test location, expressed in gpm.

D. Emergency Supply (EM_i):

The ability to utilize emergency supplies through connections from other systems or from separate sources, storage, or equipment not normally used shall be considered in reviewing the system. Credit shall be given for emergency supplies that come in automatically.

Credit will also be given for other emergency supplies when sufficient supply is available on the system being reviewed to maintain the total rate credited during the period that would elapse before delivery is possible from the emergency supplies. The total emergency supply capacity (EM) shall be the sum of all emergency supplies ($EM = \sum EM_i$) available at the test location, expressed in gpm.

E. Suction Supply (SS_i):

Where bays, rivers, canals, streams, ponds, wells, cisterns, or other similar sources are available as suction supply for fire department pumpers, the suction supply shall be considered with respect to its ability, including accessibility, availability during freezing weather, floods, droughts, or other adverse conditions to satisfy the Needed Fire Flow (NFF_i) at test locations. The total suction supply (SS) credited shall be the sum of suction supplies ($SS = \sum SS_i$) at the test location for the fire duration, or the capacity of the fire department pumping equipment, whichever is less, expressed in gpm.

F. Fire Department Supply (FDS):

Supply delivered by fire department vehicles carrying or relaying at least 250 gpm to the fire shall be credited. This application rate shall be obtained within 5 minutes of arrival at the fire site, and shall continue for the fire duration of the Needed Fire Flow (NFF_i). If the rate of flow can be increased within 15 minutes of arrival at the fire site, and can be continued for the fire duration of the Needed Fire Flow, the higher rate will be credited.

The travel time of apparatus shall be calculated from the formula:

$$T = 0.65 + 1.7D$$

T = minutes.

D = miles.

Slower speeds will be used for underpowered apparatus, or apparatus laying hose lines.

The fire department supply (FDS) shall be the capacity of the supply for the fire duration, the capacity of the source pumping equipment, the capacity of the delivery equipment, or the capacity of the final delivery pumping equipment, whichever is least, at the test location, expressed in gpm.

612. SUPPLY WORKS CAPACITY (SWC_i):

Calculate the supply works capacity, considering the fire flow duration, for each representative test location. Express the result in gpm.

$SWC_{ik} = [(MS + PU + FL + EM) - MDC] + SS + FDS$; for one supply.

Where 2 or more supplies are available at a test location,

$SWC_i = \sum_{i=1}^n SWC_{ik}$, where n = the number of supplies.

613. MAIN CAPACITY (MC_i):

The normal ability of the distribution system to deliver Needed Fire Flows (NFF_i) at those test locations considered in Item 612 shall be reviewed.

The results of a flow test at a representative test location will indicate the ability of mains to carry water to that location.

If tests are made on 2 or more systems or service levels at the same location, credit will be given for the sum of the test results on each system, or service, up to the limit of supply, for the fire flow duration at that location.

MC_i = Tested gpm at 20-psi residual pressure.

614. HYDRANT DISTRIBUTION (HD_i):

This item reviews each hydrant within 1,000 feet of a representative test location, measured as hose can be laid by apparatus, to satisfy the Needed Fire Flow (NFF_i). Credit up to 1,000 gpm from each hydrant within 300 feet of the location, 670 gpm from hydrants within 301 to 600 feet of the location and 250 gpm from hydrants within 601 to 1,000 feet of the location. The normal distribution of hydrants in the vicinity of those test locations considered in Items 612 and 613 shall be evaluated.

When there are 2 or more systems or services distributing water at the same location, credit shall be given on the basis of the joint protection provided by all systems and services available.

- A.** Sub-standard type hydrants, with at least one fire department outlet, will be considered if capable of delivering at least 250 gpm.
- B.** A cistern or other suction point shall be capable of supplying 250 gpm for at least 2 hours to be recognized.

C. The maximum credit for a hydrant may be limited by A or B above and shall be limited by the number and size of outlets as follows:

	Maximum Credit
At least one pumper outlet	1,000 gpm
Two or more hose outlets, no pumper outlet	750
One hose outlet only	500

HD_{ik} is the creditable capacity for each hydrant within 1,000 feet of the test location, expressed in gpm.

$HD_i = \sum_{i=1}^n HD_{ik}$, where n = the number of hydrants within 1,000 feet of the test location.

615. CAPABILITY OF WATER SYSTEM AT TEST LOCATION (TLC_i):

The creditable rate of flow at each test location is the lowest of NFF_i , SWC_i , MC_i or HD_i .

616. CREDIT FOR SUPPLY SYSTEM (CSS):

$$CSS = \frac{TLC}{NFF} \times 35$$

$TLC = \sum_{i=1}^n TLC_i$, where n = number of test locations.

$NFF = \sum_{i=1}^n NFF_i$, where n = number of test locations.

620. HYDRANTS - SIZE, TYPE AND INSTALLATION (PH):

Prorate points from the following subitems according to the number of hydrants of each type compared with the total number of hydrants.

	Points
A. With 6-inch or larger branch, and a pumper outlet; with or without 2½-inch outlets	100
B. With 6-inch or larger branch, no pumper outlet but 2 or more 2½-inch outlets, or with small foot valve or with small barrel	75
C. With only one 2½ -inch outlet	25
D. With less than 6-inch branch	25
E. Flush type	25
F. Cistern or suction point	25

Note 1: Deduct 2 points for each 10 percent of the hydrants not opening in the direction of the majority, or with operating nuts different from the majority.

Note 2: Deduct 10 points if more than one thread is used for pumper or hose outlets.

Note 3: Maximum points under this item are 100.

621. CREDIT FOR HYDRANTS (CH):

$$CH = \frac{PH}{100} \times 2$$

630. INSPECTION AND CONDITION OF HYDRANTS:

Inspection and condition of hydrants should be in accordance with American Water Works Association Manual M-17 - Installation, Maintenance, and Field Testing of Fire Hydrants.

A. Inspection (HI):

The frequency of inspection is the average time interval between the 3 most recent inspections.

Frequency of Inspections	Points
½ year	100
1 year	80
2 years	65
3 years	55
4 years	45
5 years or more	40

Note 1: The points for inspection frequency shall be reduced by 10 points if the inspections are incomplete. An additional reduction of 10 points shall be made if hydrants are not subjected to full system pressure during inspections. If the inspection of cisterns or suction points does not include actual drafting with a pumper, deduct 40 points.

Note 2: If there are no records of claimed inspections, deduct an additional 20 points.

B. Condition (HF):

Prorate a factor (HF) from the following list of conditions according to the actual condition of hydrants examined compared with the total number examined during the survey:

Condition	Factor
Standard (no leaks, opens easily, conspicuous, well located for use by pumper)	1.0
Usable	0.5
Not Usable	0.0

631. CREDIT FOR INSPECTION AND CONDITION (CIC):

$$CIC = \frac{(HI) \times (HF)}{100} \times 3$$

640. CREDIT FOR WATER SUPPLY (CWS):

$$CWS = CSS + CH + CIC$$