



GRAYSON COUNTY FIRE MARSHAL

On Site Fire Water Storage

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Guidelines for Calculating NFPA 1142 Minimum Water Supply

NFPA 1142 Standard on Water Supplies for Suburban and Rural Firefighting identifies a method of determining the minimum water supply necessary for structural firefighting purposes in areas where it has been determined that there is no water or inadequate water for firefighting.

NFPA 1142 §4.1.1 determines that the minimum water supply shall be calculated using the following information: Occupancy Hazard Classification (OHC), Type of Construction (CCN), Total Structure Dimensions (Length x Width x Height), and Building Exposure Hazards (if any).

Occupancy Hazard Classification (OHC) refers to a predetermined value (3-7) utilized in determining minimum water storage. Below are examples of each type. More occupancy hazard classifications/structure types can be found in **NFPA 1142 §5.2**.

- OHC 3. Flour mills, cotton gins, explosives storage, manufactured homes, plywood mfg.
- OHC 4. Commercial stables, mercantile, paper processing, repair garages, rubber mfg.
- OHC 5. Cold storage, machine shops, libraries, nurseries, restaurants, textile mfg.
- OHC 6. Bakeries, foundries, canneries, automobile/farm equipment storage, glass mfg.
- OHC 7. Apartments, hotels, motels, schools, dwellings, office suites, fire stations

The Type of Construction refers to the five classifications of building elements as prescribed by the International Building Code. Each construction type has a predetermined value for calculating minimum water storage, and is also known as the Construction Classification Number (CCN).

- Type I Fire Resistive Construction - CCN 0.5
- Type II Non Combustible Construction - CCN 0.75
- Type III Ordinary Construction - CCN 1.0
- Type IV Heavy Timber Construction - CCN 0.75
- Type V Wood Frame Construction - CCN 1.5

Total Structure Dimensions refers to the length x width x height for the total cubic volume of the structure. Building Exposure Hazards refer to any structure that is greater than 100 ft.² and within 50 ft. of another building. Exposures shall be calculated when determining minimum water storage.

NFPA 1142 §1.5 allows the Grayson County Fire Marshal as the Authority Having Jurisdiction to alter the specific requirements of the standard to allow alternative methods that secure equivalent fire protection. However, in no case shall the alternative afford less fire protection that would be provided by compliance with the provisions of these standards.

Grayson County Fire Marshal's Office has elected to utilize **NFPA 1142 §1.5** in order to provide water credits for project submittals within the jurisdiction. Water credits refers to the total amount of water carried on our first due responding fire apparatus in the event of a fire. The total amount of water credits applied to any project submittals may be up to 4,000 gallons. The water credits given shall be subtracted from the amount of water required by the water supply calculation, giving you the total amount of water storage required.

Water Supply Calculation Formula

The formula for calculating minimum water storage is as follows: **WS = (VS) (CCN) / OHC**

WS = Water Storage

VS = Cubic Volume of the Structure

CCN = Construction Classification Number

OHC = Occupancy Classification Number

If a structure is determined to have building exposure hazards, the minimum water storage required before water credits are applied shall be multiplied by a factor of 1.5.

Structures equipped with an automatic fire sprinkler system shall have enough water storage capacity to meet the minimum supply as calculated by **NFPA 1142** or the fire sprinkler system demand; whichever is greater.

Water credits of up to 4,000 gallons shall be applied after all other values for minimum water storage are determined.

EXAMPLE CALCULATION

GRAYSON FIRE wants to build a warehouse to store their extra supplies. The structure is 99 ft. long x 50 ft. wide x 18 ft. high. It is determined that the building will have a flat roof, will be of Type II construction, and there are no additional exposures.

The building is 4,950 ft.² and is not required to be sprinklered.

The total cubic volume of the building is 89,100 ft.³.

A Construction Classification Number (CCN) of 0.75 is applied for Type II construction.

An Occupancy Classification Number (OHC) of 6 is applied for automobile storage.

Utilize the formula **WS = (VS)(CCN) / OHC** to determine the minimum water supply required.

89,100 x 0.75 / 6 = 11,138 gallons of water storage.

The structure has no building exposure hazards, the additional factor of 1.5 is not needed.

4,000 gallons of water credits are applied to the amount calculated.

11,138 gallons – 4,000 gallons for Water Credits = **7,138 total gallons of water storage required.**

The **NFPA 1142 Annex H.2.4(b)** chart for water storage calculations can be utilized to check the accuracy of the formulated minimum water storage. Per the chart;

Buildings with an OHC 6, CCN 0.75, and 88,000 ft.³ require 11,000 gallons of water storage.

Buildings with an OHC 6, CCN 0.75 and 92,000 ft.³ require 11,500 gallons of water storage.

Based off of the example, our calculated 11,138 gallons of water storage for a building with OHC 6, CCN 0.75, and 89,100 ft.³ fall within the correct measurements to be considered accurate.