



FRESNO COUNTY FIRE

PROTECTION DISTRICT

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Fire Flow Requirements Standard

Scope

This standard documents the requirements for fire flow within the Fresno County Fire Protection District (FCFPD). This includes areas that have a water purveyor who can provide a fire protection water supply, or to any proposed development in rural areas without a water purveyor.

Purpose

The purpose of this standard is to place in a logical and standardized format the requirements for determination of the required quantity of water necessary for firefighting and to supply fire sprinklers for development occurring in the jurisdiction of the Fresno County Fire Protection District.

Definitions

Water Purveyor: A public utility, mutual water company, governmental body, or other entity owning or operating a water system regulated by a State or County government agency.

Fire Flow: The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138kPa) residual pressure, that is available for firefighting. (*CFC appendix B*) The firefighting water supply may be available by wet a draft or from a pressurized hydrant system as required.

Residential Development: One-and two-family dwellings, personal storage buildings given a "U" occupancy classification/Accessory to R-3.

Commercial Development: For purposes of this standard, commercial development includes multi-family and all other occupancies such as retail, service, industrial, agricultural or institutional development.

Agricultural Development: For the purposes of this standard a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products. This structure shall neither be a place of human habitation or a place of employment where agricultural products are processed, treated or packaged, nor shall it be a place used by the public.

General Requirements

- As of January 1, 2011 California State Law requires all new one and two-family dwellings, and manufactured homes built or moved into California to have a working fire sprinkler system. There are no alternatives or exceptions to this law. It's important to recognize this law is not retroactive.
- Fire flow requirements for buildings or portions of buildings and facilities shall be determined by the adopted 2019 California Fire Code or NFPA 1142 (as amended).
- Fire hydrants shall be installed per the 2019 California Fire Code.
- Wet draft systems may be permitted in rural areas for occupancies that have a fire flow requirement of 1000 gpm's or less in areas without a water purveyor and requires one hydrant with a travel distance no greater than 450 feet along an approved access road. (NFPA 1142 as amended). *See FCFPD standard #1*
- Systems having two or more hydrants shall be pressurized to meet the required fire flow and any fire sprinkler demand at not less than 20psi residual pressure at the most remote location.
- Wet draft hydrants or direct tank connections shall be installed per FCFPD wet draft hydrant requirements. *See FCFPD standard #2A, 2B and 2C*

1. Residential Development

- The minimum required fire flow shall be 1,000 gallons per minute for subdivisions.
- All required fire flows including fire sprinkler demand plus domestic demand shall be available within the water system at a minimum of 20 pounds per square inch residual pressure or the minimum pressure required for fire sprinkler operation.
- For areas with a water purveyor a flow test certificate will be required by a licensed C-16 Fire Protection Contractor.
- Sprinkler systems will be designed by a licensed C-16 Fire Protection Contractor or a Registered Fire Protection Engineer and installed by a licensed C-16 Fire Protection Contractor.
- Development in the State Responsibility areas of the FCFPD must comply with Fresno County Ordinance 15.60.
- For detached accessory buildings refer to *FCFPD Policy # 2016-01*

2. Commercial Development

- New Construction occupancies less than 5,000 square feet and not required to be protected by an Automatic Fire Sprinkler system in the 2019 California Fire Code, NFPA 13, 13R, or 13D standards shall not be required to be protected by an Automatic Fire Sprinkler system when using the *NFPA 1142 Rural Supply Variance*.
- All required fire flows including fire sprinkler demand plus domestic demand shall be available within the water system at a minimum of 20 pounds per square inch residual pressure or the minimum pressure required for fire sprinkler operation.
- For areas with a water purveyor a flow test certificate will be required.
- Special high fire hazard occupancies may require larger flow rates and will be addressed on a case-by-case basis.

3. Agricultural Development

- For Agricultural Processing/Storage Buildings. *See FCFPD Policy # 2014-01*
- For Agricultural Exempt Locations. *See FCFPD Policy #2015-01*



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FIRE FLOW REQUIREMENTS RURAL SUPPLY VARIANCES FROM THE FIRE CODE

SECTION 1: STRUCTURES

Rural fire flow supply requirements may be amended from Appendix B of the California Fire Code (CFC) when there is no reliable water supply system in place to protect the subject property and scope of work. The following information is designed to provide guidelines to establishing “reasonable” fire flow and water storage values for such areas based upon the identified factors. In order to mitigate a portion of the normally required fire flow both active and passive building design components will be considered.

Active systems include automatic notification and suppression systems such as fire sprinklers and fire alarms where they would not otherwise be required by the code. Early notification of a fire condition will help responders to arrive at the earlier stages of the fire, increasing the chances of successfully saving the structure. Automatic fire suppression systems such as fire sprinklers initiate the suppression activity while fire fighters are responding to the fire. Such systems are not designed to extinguish the fire, but rather, are design to hold the fire in check, or significantly slow the growth rate. Studies performed by the California Fire Sprinkler Advisory Board during the 1990’s determined that in properly designed and operational systems, 80% of the fires were controlled by the activation of three (3) fire sprinklers. This equates to keeps the fire area to about 500 square feet of the structure when fire fighters arrive.

Passive design components are designed to resist the spread of the fire. Such systems include fire rated construction, draft stopping, higher classification of roof coverings, separation in between buildings, separation between buildings and vegetation, and separation between buildings and property lines.

CRITERIA FOR CONSIDERATION OF ALTERNATIVE FIRE FLOW REQUIREMENTS

All of the following must be met to consider alternate fire flow compliance.

- There must not be an available water supply system adjacent to the site (more than 1000 feet) capable of meeting the required fire flow.
- An automatic fire sprinkler system must be provided in accordance with NFPA 13. NFPA 13R or 13D systems may be considered when applicable to the proposed project.

Exception: Newly constructed structures with a fire area less than 5,000 square feet and not required to be protected by Automatic Fire Sprinkler system in the 2016 California Fire Code, NFPA 13, 13R, or 13D standards shall not be required to be protected by Automatic Fire Sprinkler system when using the NFPA 1142 Rural Supply Variance

- Fire access must be provided to the site and the proposed buildings on the site in accordance with the CFC.
- NOTE: See FCFPD Policy 2014-01 for low hazard agricultural buildings (F2/S2 Occupancies).

EXTREMELY LOW RISK LIMITED AREA STRUCTURES – SPECIAL CRITERIA

Certain structures are of limited size and nature that they pose virtually no risk to responders and have no other structure exposures associated with them. These are cases where the fire flow required by NFPA 1142 is within the 10,000 gallons capacity typically carried on fire service engines and water tenders. Such low hazard occupancies include but are not limited to dwellings, accessory structures, and offices (Class 7 per NFPA 1142). The footprint of the structure will vary based upon the construction materials and height of the structure. In such cases only on-site portable fire extinguishers are required. This is typically 1; 2A10BC-rated portable fire extinguisher but 2 fire extinguishers may be required.

RESIDENTIAL MIXED-USE STRUCTURES – SPECIAL CRITERIA

New residential mixed-use structures shall be permitted to use a 13D system throughout the residential portion of the building. If the adjacent portions of the mixed-use structure is compatible such as in the case of an attached garage, U-Occupancy, then the garage shall be protected to the same level as the residence per the California Residential Code and NFPA 13D, within the following limitations:

- The secondary use does not exceed its non-sprinklered tabular value for allowable area from CBC (2022 Edition) Table 506.2 based upon the type of construction.

When the secondary use exceeds its permissible tabular value for allowable area based upon CBC (2022 Edition) Table 506.2 then the secondary use shall be equipped with fire sprinklers in accordance with NFPA 13 (not 13D or 13R). This includes all required components, including but not limited to the underground, water supply, fire pump, alarm monitoring, exterior bell, FDC, etc.

When the secondary use is not considered compatible as outlined in the CRC (not a U-Occupancy) then an appropriate separation is required between the spaces. Fire sprinklers are required as indicated above in all structures that are 5000 square feet and larger, that are using the Rural Fire Flow Variance. Since the California Fire Code indicates that for purposes of fire sprinkler protection a 4-hour wall is required to omit fire sprinkler protection, structures under 5000 square feet may have the secondary use exempted when providing the required 4-hour fire wall.

DISCUSSION OF THRESHOLDS & EXAMPLES

The values given for fire flow are an amalgam of various factors. NFPA 1142 attempts to provide guidance for providing fire flow volumes which differ from the CFC. The general presumption of NFPA 1142 is that a municipal (reliable) water supply is not available. The fire flow values are intended to provide adequacy for structural firefighting but do not completely deal with the rate or method of water application. This decreases its values as a “stand alone” document for use by Fresno County Fire/CAL FIRE.

To provide guidance to designers seeking reasonable alternative methods of achieving adequate fire flow, the Fire Flow Matrix Table has been created. This table cross references protection requirements with response times. Clearly, the longer a fire is burning prior to the application of suppression, the greater the amount of manpower will be required and the less likely it that such efforts will be successful. Correspondingly, the matrix requires higher values (greater water storage capacity) in areas with increased response time.

ALTERNATIVE FIRE FLOW

The required flow rate and storage capacity shall comply with the following:

Flow Rate: NFPA 1142 or Fire Sprinkler Demand

Minimum Storage: NFPA 1142 or Fire Sprinkler Demand whichever is greater.

EXAMPLE: #1

Church in the State Responsibility Area

Project information:

- Area: 4300 sq ft
- Volume: 98,000 cubic feet
- Type of Construction: V-B
- Occupancy Class: A3 / Class 6 – NFPA 1142
- Exposure Hazard: N/A

To qualify for consideration of the alternative measures this building must be equipped throughout with an automatic fire sprinkler system (criteria #2 above).

Water Storage Capacity per NFPA1142:

$$WS = (VS)(CC) / OHC$$

Therefore: $WS = (98900) (1.5) / 6 = 24,750$ gallons (approximately).

According to the “**Alternative Fire Flow**” the following values are derived:

Flow value: NFPA 1142 plus Fire Sprinkler Demand. From Table 4.6.1 this is 1000 GPM plus the fire sprinkler system demand estimate at 250 GPM for light hazard with minimum hose allowance. Therefore: $1000 + 250 =$ **1250 GPM at 20 PSI** residual pressure. (**Not to exceed CFC – 1500 GPM at 20 PSI**)

Minimum Storage: NFPA 1142 or Fire Sprinkler Demand

$24,750$ gallons or $[0.1 \text{ GPM/SQ FT (light hazard occupancy)} \times 1500 \text{ sq ft} + 100 \text{ GPM}] \times 30 \text{ minutes} = 7500$ gallons. Therefore: $24,750$ or $7500 =$ **24,750 gallons** of water storage.

CFC REQUIREMENTS

Fire Sprinklers not required under previous editions of the CBC/CFC, may be required under 2016 CBC/CFC. We shall consider the building to be equipped with fire sprinklers for equivalency in analysis.

SECTION 2: NON-STRUCTURE USES

California Fire Code Section 507.1 indicates that an approved water supply is required for fire protection, “upon which facilities, buildings or portions of buildings” are utilized. Section 507.3 indicates that the protection required in 507.1 shall be provided by an approved method or by CFC Appendix B. Unfortunately, Appendix B does not address water supply for facilities, (non-structure uses) that may pose significant hazards. Such uses need to have on-site means of extinguishment for such hazards. Section 507.3 directs the Fire Department to determine an approved method, since Appendix B states that it is applicable only to buildings.

In considering such hazards this section will consider the water storage reductions allowed for structures in establishing thresholds for non-structure uses. The limitation of the size of individual piles as well as the spacing between piles are the primary considerations in limiting the hazard level. Larger more tightly packed piles constitute greater risk and more complex fire suppression operations.

THRESHOLD LEVELS

The threshold levels for consideration of pile sizes shall be roughly equivalent to the volume of combustible storage buildings. The current alternative water flow and storage standard NFPA 1142 is based upon several factors as indicated above.

Where a “pile” of product is stored where it is exposed (not inside a building) the threshold volumes for consideration are as follow:

1. Where the piles are separated by not less than 50 feet from structures and other piles the pile size shall be limited to 35,000 cubic feet. Piles in excess of this size will require on site water storage and one or more fire hydrants to provide adequate fire suppression.
2. Where the piles are located less than 50 feet from structures or other piles the pile size shall be limited to 24,000 cubic feet. Piles in excess of this size will require on site water storage and one or more fire hydrants to provide adequate fire suppression. In no case may piles be less than 20 feet from structures. If located less than 20 feet from other piles, the cumulative volume shall be considered as one pile for application of this requirement.

A. RECYCLING CENTERS

Recycling Centers pose potentially significant hazards to fire safety due to the large quantities of combustible materials typically found at such locations; including but not limited to plastic, cardboard, paper and Styrofoam.

B. PALLET YARDS

Pallet yards shall include fabrication, storage and resale locations for woods and/or plastic, pallets and/or bin boxes.

C. DUMPING GROUNDS

Shall include waste dumps and similar uses where products are not buried below grade.



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POLICY #2014-01 “WATER STORAGE REDUCTION FOR AGRICULTURAL PROCESSING/STORAGE BUILDINGS”

The Fresno County Fire Protection District will modify the alternative fire flow design requirements for rural fire flow supply for agricultural buildings as follows:

1. The required water storage as indicated by NFPA 1142, 2012 Edition, may be reduced 50% when the project complies with all requirements listed below (items A-F).
2. Water storage required NFPA 13 and NFPA 1142 do not need to be added together, the greater required water storage will be the required water storage when the project complies with all requirements listed below (items A-F).

The following is the list of requirements for a project to be considered for the water storage reductions. All items listed below must be met in order to be considered.

- A. An automatic fire sprinkler system must be provided in accordance with NFPA 13. NFPA 13R or 13D systems may be considered when applicable to the proposed project.
- B. The building meets the requirements for the use of NFPA 1142 as indicated in the FCFPD Ordinance.
- C. The project building or buildings must be for agricultural food processing and/or agricultural food storage.
- D. The project building or buildings must qualify as “Low or Moderate Hazard” (F1/F2 and/or S1/S2 Occupancies) under the California Fire Code and California Building Code.
- E. The project building or buildings must meet all other current code requirements that may apply (such as high piled storage requirements which include smoke and heat vents, exterior access doors, etc.).
- F. The architect of record shall provide to the FCFPD, the volume (in cubic feet) of each proposed building to be considered for any project.

NOTE: If the project contains fumigation chambers utilizing hazardous materials within the exempt amounts, and the project complies with items A through F above, it shall qualify for use of the fire flow reduction. If the storage or use of hazardous materials exceeds the exempt amounts the project shall comply with all applicable code requirements and shall not be permitted to use the reduced fire flow criteria.

This policy does not extend to any other uses or occupancy groups but shall include accessory uses/spaces such as office space and lunchrooms for Approved Occupancies complying with items A through F above.



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Policy # 2015-01 Group "U" Agricultural Buildings

Scope

The Fresno County Fire Protection District (FCFPD) will modify the alternative fire flow design requirements for rural fire flow supply for Group "U" Agricultural Buildings. Agricultural buildings are structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products. This structure shall neither be a place of human habitation or a place of employment where agricultural products are processed, treated or packaged, nor shall it be a place used by the public. (CFC Chapter 2, pg.31)

The following structures are exempt from onsite fire flow storage;

1. Livestock shelters or buildings, including shade structures open on all sides specifically designed for animal husbandry.
2. Hay covers open on all sides with a minimum 50-foot setback from other structures, not more than 5,000 square feet with a height of not more than 35 feet.
3. Buildings used as barns, equipment storage structures, stables, poultry buildings and other similar uses as approved/recognized by FCFPD with a total fire area of 2,500 square feet or less in size. One 2A-10BC-rated portable fire extinguisher is required.
4. "Type V" building construction with an area less than 1500 square feet.
5. Greenhouses, horticulture structures, nurseries and similar uses with a total fire area of 2,500 square feet or less in size.
6. Riding arenas open on all sides, no storage of combustible materials is allowed underneath.



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POLICY # 2016-01 “WATER STORAGE REDUCTION FOR DETACHED ACCESSORY BUILDINGS”

The Fresno County Fire Protection District will modify the alternative fire flow design requirements for rural fire flow supply for detached accessory storage buildings as follows:

1. When the building area is 600 square feet or less there is no Fire Flow requirement.
2. When a Type “V” building area is between 601 to 1500 square feet, one 2A:10ABC rated portable fire extinguisher is required.
3. When a “Type V” building area is over 1500 up to 2000 square feet, 2000 gallons of water storage with a wet draft hydrant is required. When the building area is over 2000 square feet the applicant shall comply with the California Fire Code or NFPA-1142 (as amended) and *FCFPD standards 1, 2A and 2B*.
4. For other building types if the building area is between 600 to 2500 square feet, one 2A:10BC-rated portable fire extinguisher is required. When the building area is over 2500 square feet the applicant shall comply with either the California Fire Code or NFPA-1142 (as amended) and *FCFPD standards 1, 2A and 2B*.

The following is the list of requirements for a project to be considered for the water storage reductions.

- A. A building or structure of an accessory character given a “U” Occupancy classification/Accessory to R-3.
- B. Buildings will maintain a 50-foot separation from inhabited or other structures and not considered an exposure.

Note: If an existing 2000+ gallon storage tank is on site in the State Responsibility Area it will fulfill the requirement of this policy.

This policy does not extend to any other uses or occupancy groups.

This policy replaces FCFPD Policy #2014-02 “Water Storage Reduction for Personal Storage Buildings”