



# Ensuring supplies of firefighting water in extreme weather conditions

**CFPA-E Guideline No 8:2022 N**





The CFPA Europe develops and publishes common guidelines about fire safety, security, and natural hazards with the aim to achieve similar interpretation and to give examples of acceptable solutions, concepts, and models. The aim is to facilitate and support fire protection, security, and protection against natural hazards across Europe, and the whole world.

Today fire safety, security and protection against natural hazards form an integral part of a modern strategy for survival, sustainability, and competitiveness. Therefore, the market imposes new demands for quality.

These Guidelines are intended for all interested parties and the public. Interested parties includes plant owners, insurers, rescue services, consultants, safety companies and the like, so that, in the course of their work, they may be able to help manage risk in society.

The Guidelines reflect best practice developed by the national members of CFPA Europe. Where these Guidelines and national requirements conflict, national requirements shall apply.

This Guideline has been compiled by the Natural Hazards Group and is adopted by the members of CFPA Europe.

More information: [www.cfpa-e.eu](http://www.cfpa-e.eu)



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**Contents**

1 Introduction ..... 4  
2 Scope ..... 4  
3 Definitions..... 4  
4 Water sources categorization ..... 5  
5 Management considerations..... 6  
6 Recommendations for hot weather ..... 8  
7 Fire safety recommended additional measures ..... 9  
8 Measures to minimise the scale of a fire..... 9  
9 Water quality..... 10  
10 Additional considerations ..... 11  
European guidelines ..... 12

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## **1 Introduction**

Experience clearly demonstrates that natural hazards can endanger life, health, and the environment and cause considerable property damage. Therefore, protection against natural hazards is an essential task for society, which the Natural Hazards Group (NHG) of CFPA Europe has also taken on since 2012. Furthermore, natural hazards are also affected by ongoing climate change, so this protection against natural hazards plays a vital role in climate change adaptation and sustainability. The impacts of natural hazards are greatly increased by ongoing climate change, this is evidenced by scientific studies, it can be seen and reported all over the world. The consequences of climate change can be caused by extreme weather events and changes in meteorological parameters, e.g., regional, and seasonal increase of average temperatures, and changes in precipitation distributions.

Concepts and measures for protection against natural hazards should be regularly checked in risk management and adapted, if necessary. This adaptation should take regional and local differences into account as well as the impacts of climate change, regional and local exposure, and vulnerability to natural hazards. The resilience of society, the ecology, the economy, each as a system, including infrastructure, must be considered as the objective within all adaptations and concepts to ensure or maintain the necessary system function.

It is now generally recognised that our climate has changed with periods of increasingly warm weather and unusually cold weather. These extremes of temperature have implications for the availability of water supplies for firefighting purposes and most importantly for fixed fire suppression systems. This guidance document aims to provide advice with regard to practical steps that may be taken to maintain the availability of suitable volumes and pressures of water supply for emergency use. The immediate availability of suitable water supplies is vital to minimise deaths and injuries, as well as losses arising from damage to property and business interruption.

## **2 Scope**

This guideline is intended to provide background information for insurers, fire safety managers and other duty holders concerned with the availability and reliability of water supplies for firefighting purposes during prolonged periods of unusually hot or cold weather.

Water supply for fighting of forest fires and wildfires is outside the scope of this guideline (See CFPA E Guideline No 6 2016 N).

Supplies of water for other uses, including those intended for cooling of industrial processes, drinking or the preparation of food are outside the scope of this publication.

## **3 Definitions**

**Biofilm:** A layer of micro-organisms contained in a matrix which may appear as slime on the surface of water.

**Brackish water:** Water that is impure with some salinity; brackish water may occur in estuaries or in some aquifers.

**Grey water:** Wastewater generated from hand wash basins, showers and baths which may be retained and recycled for purposes that do not involve human consumption, such as flushing WCs and firefighting.

**Legionella:** This is the generic term used to describe bacteria including Legionella pneumophila, found in soil and watercourses, which can cause severe pneumonia, often known as legionnaires disease, in susceptible people. The same bacteria can cause a mild fever, known as Pontiac fever, in otherwise healthy individuals.

**Water supply:** The term 'water supply' is used here to include a source of water including town mains, rivers, reservoirs, lakes, swimming pools and private tanks. (As a secondary source of water in an emergency, a swimming pool has the advantage that although the volume of the water may be somewhat limited, it is normally of a high quality and does not have to be pumped very far.)

#### 4 Water sources categorization

Firefighting water sources can be basically categorized as follows:

- Natural water sources that are not specifically for firefighting purposes, e. g. river, lake, stream, ponds, sea etc.

*Note: Natural water sources without continual flow may not be available in cold weather.*

- Artificial water sources built specifically for firefighting purposes, e. g. fire tanks, wells, firefighting water supply pipeline, firefighting water reservoirs, fire hydrants, etc.
- Multi-purpose water sources built for multipurpose use including firefighting water supply, e. g. swimming pool, pond, well, water reservoir, dam



Figure 1: Examples of fire hydrants



## 5 Management considerations

- 5.1 A fire risk assessment should be undertaken for virtually every workplace in accordance with national legislation. This should consider, among other issues, the availability of water supplies for firefighting purposes and the implications of extreme weather conditions on the continuity of this utility. Inspections of the water levels in the selected emergency supplies should be made at the time of the periodic reviews of the fire risk assessment (see 8.6). The continuing availability of water supplies in icy weather conditions should also be considered as part of this exercise.
- 5.2 The approximate response time for the fire and rescue service should be established for normal, inclement, and icy weather conditions and also form part of the risk assessment process.
- 5.3 Where a new property is being planned in a rural area, a preliminary assessment should be undertaken at the design stage. At this time advice should be sought from the relevant water supply company, the local fire and rescue service and insurer of the premises regarding the availability of water supplies for firefighting purposes. The actions taken and the cost of required actions should be in relation to the level of assessed risk (cost and likelihood).
- 5.4 The fire risk assessment should be supported by an emergency plan which should be recorded and subject to periodic rehearsal and review by means of tabletop exercises.
- 5.5 At the time of the fire risk assessment consideration should be given to the adoption of alternative firefighting media that are less dependent on water supplies. Water mist (which uses considerably less water than a sprinkler system) and inert gas fire suppression systems may be appropriate in some circumstances. Inert gas suppression systems may be particularly advantageous where extremely cold conditions (-10°C – 40°C) may be encountered.
- 5.6 All practical steps should be taken to ensure the continuity and reliability of water supplies in accordance with the requirements for the category of sprinkler system which is installed.

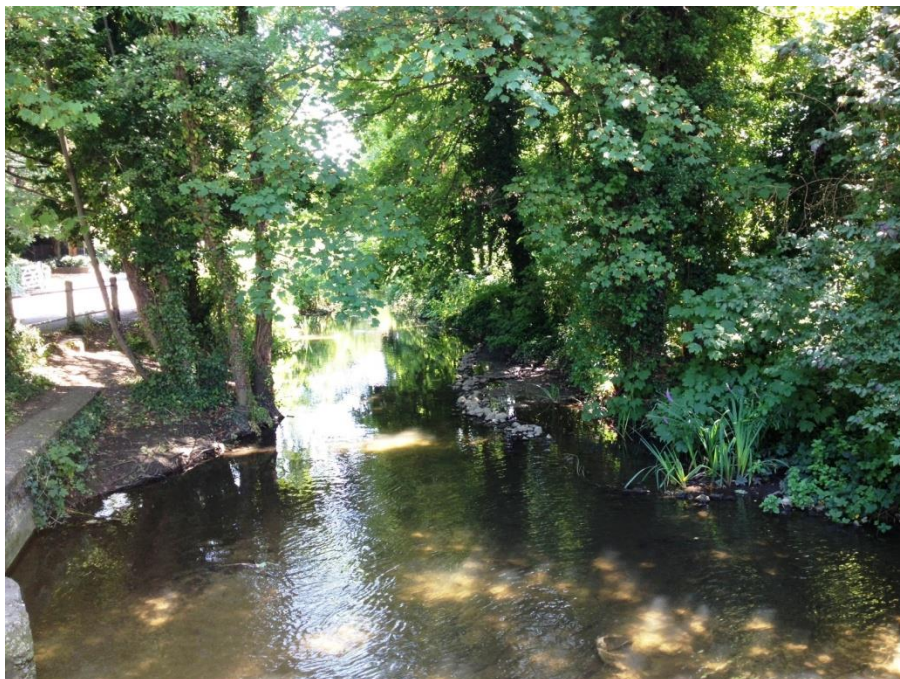


Figure 2: Smaller water courses may not provide a sustainable source of firefighting water in periods of drought.

## **7 | GUIDELINE No 8:2021 N**

- 5.7 Water supplies should preferably be under the control of the user. Where this is not the case the reliability and right of use should be guaranteed by the organisation having control.
- 5.8 In addition to the fire risk assessment, a further risk assessment should be undertaken by a competent person in accordance with national standards to monitor the quality of the water, in particular the assessment should include the potential for bacterial growth, the potential for legionella transmission and the potential for human infection (see section 8).

- 5.9 Where there are other businesses in the area which also have limited water supplies, effective liaison should be established with the aim of sharing water supplies and also facilities such as pump relays, bowsers (see 5.7) and mobile pumps.
- 5.10 Access to a firefighting ring main should not be permitted for tasks such as watering grass, washing vehicles, or other pressure washing activities.
- 5.11 Where an emergency has resulted in salt or brackish water being introduced into a fire suppression system, specialist advice should be sought regarding flushing, cleaning, and replacing parts of the system, if necessary, before reinstating the installation and recharging with fresh water. Salt or brackish water should not be allowed to remain in the system any longer than necessary.
- 5.12 Where brackish or grey water supplies are to be used, consideration must be given to the fitting of bronze impeller in pumps to avoid corrosion.
- 5.13 In the case of business-critical installations, consideration should be given to the benefits of installing a proprietary linear optic fibre heat detection system to monitor the temperature of supply pipes, range pipes and other elements of fire suppression installations.

## **6 Recommendations for hot weather**

- 6.1 Wherever practicable, water supplies should be maintained in accordance with national standards and best practice. This will normally require fixed firefighting systems to be fed by dual water supplies, at least one of which should be a fixed tank with a capacity determined by the hydraulic calculations applying to the specific installation.
- 6.2 In order for a sprinkler system to operate efficiently by using the minimum volume of water necessary to control a fire, a wet pipe system should be installed wherever this is appropriate as this reduces the delay in the application of water to the flames.
- 6.3 Water tanks should be covered or enclosed to exclude sunlight; where practicable, tanks may be situated below ground. These precautions minimise the loss of water by evaporation and prevent contamination of the water supply. If sand, for example, were to enter the tank there may be a surface layer of fine particles and the build-up of silt over a period of time which would necessitate draining and cleaning the tank.
- 6.4 A hatch or hatches should be available in the tank cover to allow inspection of the water and periodic sampling for bacteria.
- 6.5 Sprinklers, drenchers, and similar installations should be serviced and maintained in accordance with national standards to ensure they work with maximum efficiency.
- 6.6 Where new installations are being designed, efforts should be made to locate tanks and pipework in areas that are normally cool, (ideally where the temperature is no more than 20°C); away from direct sunlight and nearby sources of heat or warm air currents in order to maintain the quality of the supply.
- 6.7 For remote locations with poor water supplies and prolonged response times for fire services, dedicated water bowsers for firefighting purposes only should be considered in addition to water storage tanks. The quantity of water carried by the bowsers should be determined by risk assessment and the relevant hydraulic calculations.
- 6.8 Ventilation (in addition to that required where diesel pumps are housed) may need to be provided for pump rooms and the areas housing the main stop valves during hot weather.





Figure 3: The best solution – a dedicated water storage tank.

## **7 Fire safety recommended additional measures**

- 7.1 In winter, the temperature of stored water supplies and feed pipes should be maintained no lower than 4°C to prevent freezing and associated damage to the installation.
- 7.2 Where it can be foreseen that the ambient temperature may descend below 4°C in the winter or night-time, consideration should be given to installing trace heating, in addition to lagging the pipe work, in accordance with national standards and the requirements of the insurers of the property.
- 7.3 Where sprinklers are installed in a heated property, trace heating and lagging may still be required in roof areas and the immediate vicinity of loading bays and doorways from the outside which are in frequent use.
- 7.4 The temperature of the pump room should be monitored and not allowed to fall below 4°C where electric pumps are employed and not below 10°C where diesel pumps are utilised.
- 7.5 The area where the main stop valves are located should not be allowed to fall below 4°C.
- 7.6 If there are pumps located at spots where water might freeze non-moving water, pumps need to be set free from water as soon as possible.
- 7.7 Check battery levels on fire-safety equipment if cold temperatures occur.
- 7.8 If special there is a special extinguishant at use, check its performance at cold temperatures (Most of them work till -15°C).

## **8 Measures to minimise the scale of a fire**

In the event of a fire occurring, the volume of water necessary to quench the flames may be minimised by implementing a number of actions:

- 8.1 Additional fire compartmentation of the buildings will serve to restrict the spread of fire and hence reduce the demand on firefighting water supplies. Smaller compartments also assist in reducing property loss and business interruption in the event of fire.
- 8.2 Upgrading the level of cover of the automatic fire detection and alarm installation to a superior system in compliance with national standards may result in an earlier detection of a fire and again assist in minimising the quantities of water required for firefighting.
- 8.3 An adequate number of suitable fire extinguishers should be provided and sited in appropriate locations throughout the premises in accordance with national standards. In addition, a number of staff should be trained in the selection and use of portable fire extinguishers, including receiving practical instruction in their operation. These measures should assist in providing rapid and effective intervention by staff, if this can be done safely, and the reduction in the demand for firefighting water.
- 8.4 The use of non-combustible building materials for the external cladding and internal compartmentation of a building can greatly reduce the severity of a fire. Thus, the use of bricks and blocks is preferable to some types of composite panelling materials.



Figure 4: An emergency water supply

## **9 Water quality**

- 9.1 The quality of firefighting water supplies, especially when they originate from natural sources, must be monitored by a competent person on a regular basis (for example annually). Not only is there a potential hazard to the installation if solid particles, including those suspended in the water, sand, grit and stones, find their way into the fire suppression system. There is a potential life safety hazard if circumstances exist where legionella could develop.
- 9.2 In addition to the water supplies for automatic fire suppression systems, the quality of the water delivery systems and quantities of water held within firefighting ring mains and hose

reel installations should also be addressed at the times of the periodic monitoring tests. (Portable fire extinguishers are not considered a risk in this respect.)

- 9.3 The periodic tests of the quality of stored water should incorporate a simple bacterial survey to measure total bacterial content (not just legionella). Where a positive result is obtained, a programme of treatment and further testing should be undertaken until a satisfactory result is achieved.
- 9.4 Suitable water treatments should be utilised where possible to kill legionella or limit the ability to grow.
- 9.5 The preferred method for of chemical water treatment for the control of legionella (and other bacteria) in a fire fighting installation is the use of a biocide such as chlorine dioxide. One of the difficulties associated with biocides, however, is the lack of biofilm penetration. It may therefore be necessary to incorporate a dispersant with the biocide to assist in the disinfection.
- 9.6 Where water is drawn from natural water courses, measures should be taken to avoid particulate matter being introduced into the pumps and other elements of the firefighting equipment. This is particularly important during drought conditions when the water levels in rivers, canals or lakes may be receding due to evaporation and removal for watering crops etc.
- 9.7 Pipe lengths should be kept as short as possible, and the design should eliminate dead ends and similar areas where water could stagnate.

## **10 Additional considerations**

- 10.1 Leakage of water, whatever the cause, should be minimised. Any leaks should be addressed without delay and any pipe work that appears to be suffering from corrosion should be replaced.
- 10.2 Where possible, make arrangements to retain run-off water from firefighting operations in order that it may be reused if necessary.
- 10.3 Where one of two water supplies is via the town main, suitable arrangements must be put in place to prevent back flow and contamination of the mains water supply. These arrangements should be designed and installed in conjunction with the relevant water company.
- 10.4 The control valves of automatic fire suppression systems should not be located in a low-lying area that is prone to flooding, either by natural causes or by run-off water from the firefighting operations. The valves should be safely accessible in the event of a fire, adequately protected from freezing and secured against tampering.
- 10.5 The control valves should be opened and closed slowly to avoid pressure surges which cause sediment movements in the pipelines. An intermediate tank (e.g., a tanker) prevents pressure surges caused by nozzles.

**European guidelines***Fire*

- Guideline No 1 F - Internal fire protection control
- Guideline No 2 F - Panic & emergency exit devices
- Guideline No 3 F - Certification of thermographers
- Guideline No 4 F - Introduction to qualitative fire risk assessment
- Guideline No 5 F - Guidance signs, emergency lighting and general lighting
- Guideline No 6 F - Fire safety in care homes
- Guideline No 7 F - Safety distance between waste containers and buildings
- Guideline No 8 F - Preventing arson – information to young people
- Guideline No 9 F - Fire safety in restaurants
- Guideline No 10 F - Smoke alarms in the home
- Guideline No 11 F - Recommended numbers of fire protection trained staff
- Guideline No 12 F - Fire safety basics for hot work operatives
- Guideline No 13 F - Fire protection documentation
- Guideline No 14 F - Fire protection in information technology facilities
- Guideline No 15 F - Fire safety in guest harbours and marinas
- Guideline No 16 F - Fire protection in offices
- Guideline No 17 F - Fire safety in farm buildings
- Guideline No 18 F - Fire protection on chemical manufacturing sites
- Guideline No 19 F - Fire safety engineering concerning evacuation from buildings
- Guideline No 20 F - Fire safety in camping sites
- Guideline No 21 F - Fire prevention on construction sites
- Guideline No 22 F - Wind turbines – Fire protection guideline
- Guideline No 23 F - Securing the operational readiness of fire control system
- Guideline No 24 F - Fire safe homes
- Guideline No 25 F - Emergency plan
- Guideline No 26 F - Fire protection of temporary buildings on construction sites
- Guideline No 27 F - Fire safety in apartment buildings
- Guideline No 28 F - Fire safety in laboratories
- Guideline No 29 F - Protection of paintings: transports, exhibition, and storage
- Guideline No 30 F - Managing fire safety in historic buildings
- Guideline No 31 F - Protection against self-ignition and explosions in handling and storage  
-of silage and fodder in farms
- Guideline No 32 F - Treatment and storage of waste and combustible secondary raw  
-materials
- Guideline No 33 F - Evacuation of people with disabilities
- Guideline No 34 F - Fire safety measures with emergency power supply
- Guideline No 35 F - Fire safety in warehouses
- Guideline No 36 F - Fire prevention in large tents
- Guideline No 37 F - Photovoltaic systems: recommendations on loss prevention

*Natural hazards*

- Guideline No 1 N - Protection against flood
- Guideline No 2 N - Business resilience – An introduction to protecting your business
- Guideline No 3 N - Protection of buildings against wind damage
- Guideline No 4 N - Lighting protection
- Guideline No 5 N - Managing heavy snow loads on roofs

Guideline No 6 N - Forest fires

Guideline No 7 N - Demountable / Mobile flood protection systems

*Security*

Guideline No 1 S - Arson document

Guideline No 2 S - Protection of empty buildings

Guideline No 3 S - Security systems for empty buildings

Guideline No 4 S - Guidance on keyholder selections and duties

Guideline No 5 S - Security guidelines for museums and showrooms

Guideline No 6 S - Security guidelines emergency exit doors in non-residential premises

Guideline No 7 S - Developing evacuation and salvage plans for works of art and  
-heritage buildings

Guideline No 8 S - Security in schools

Guideline No 9 S - Recommendation for the control of metal theft

Guideline No 10 S - Protection of business intelligence

Guideline No 11 S - Cyber security for small and medium-sized enterprises







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