European Guideline

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Ensuring supplies of firefighting water in extreme weather conditions

CFPA EUROPE

European Guideline

FOREWORD

CFPA Europe develops and publishes common guidelines in order to achieve similar interpretation in the European countries and to give examples of acceptable solutions, concepts and models. CFPA Europe has the aim to facilitate and support fire protection, security and protection against natural hazards.

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

These Guidelines are primarily intended for the public. They are also aimed at rescue services, insurers, consultants, safety companies and the like so that, in the course of their work, they may be able to help manage risk in society.

These 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 all members of CFPA Europe.

Copenhagen, XX Month 2021
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1. Introduction

Due to the long-term experience, 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 that protection against natural hazards plays a vital role in climate change adaptation and sustainability. Its impacts are increasingly expected in the ongoing climate change due to scientific studies and visible and realized. These negative consequences can be caused by extreme weather events and changes in meteorological parameters, e. g. regionally and seasonally rising of average temperatures, increasing, or/and shifting of precipitation distributions.

Therefore, 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 in impacts of climate change, regional and local exposure, and vulnerability to natural hazards into account. And the resilience of society, ecologic, economy each as a system, e.g., infrastructure, must be considered as the objective within all adaptation concepts to ensure or maintain the necessary system function.

Concepts and measures to protect against natural hazards should also be sustainable according to the sustainable development goals of the United Nations, especially in terms of climate action (mitigation and adaptation), resilient infrastructure, sustainable cities and communities, and quality education.

Related to the topic of the present guideline, the 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 wild fires is not the issue of the present 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 involved human consumption, such as flushing WCs and firefighting.

Legionella
This is the generic term used to describe bacteria including Legionella pneumophilia, 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

Natural water sources
Water source not determined directly for firefighting purposes – river, lake, stream, ponds, sea etc.

Artificial water sources
Water sources built specifically for firefighting purposes - fire tanks, wells, firefighting water supply pipeline, firefighting water reservoirs, fire hydrants, etc.

Multi-purpose water sources
Water reservoir built for multipurpose use including firefighting water supply – swimming e. g. pool, pond, well, water reservoir, dam

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

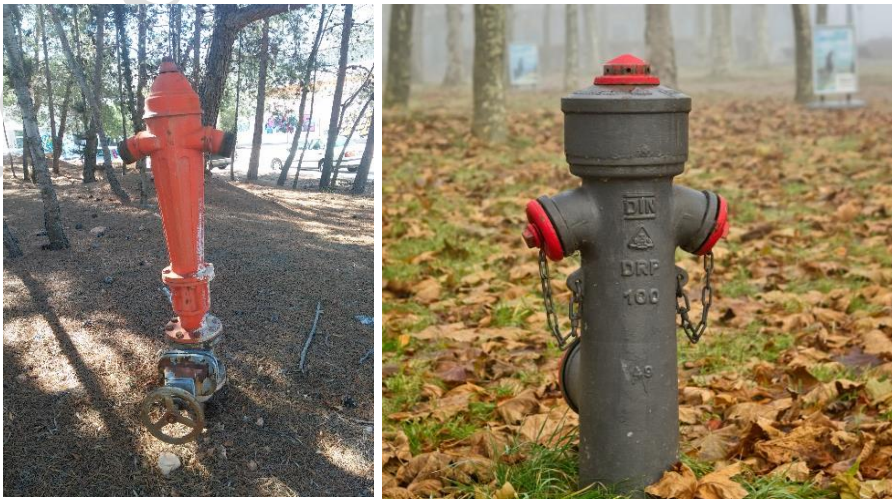

Figure 1: Examples of fire hydrants

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 expenses of required actions should be in relation to the level of assessed risk (expenses 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 table top 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^{o}C - 40^{o}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.

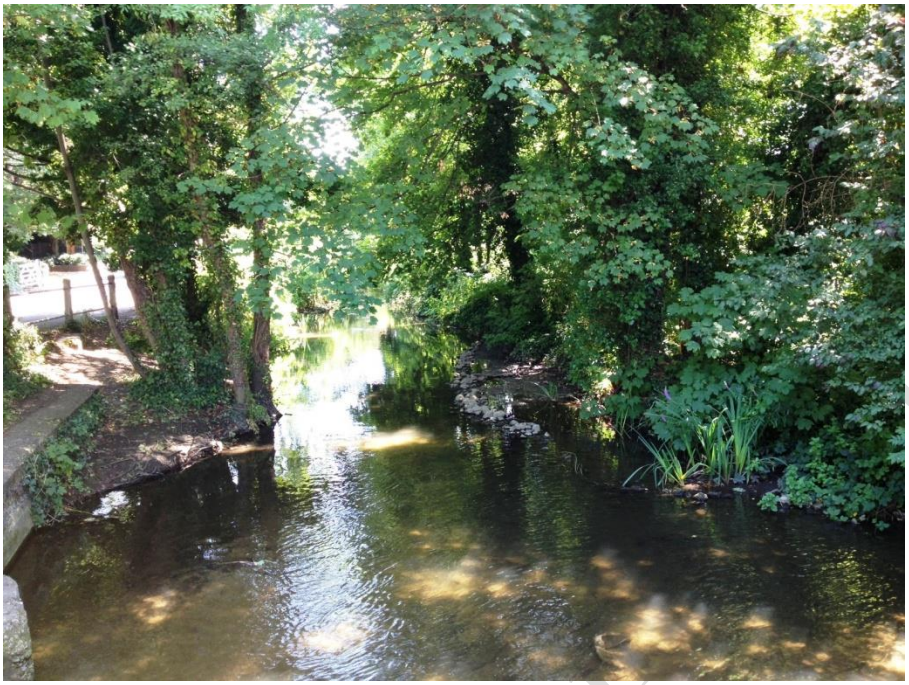

Figure 2: Smaller water courses may not provide a sustainable source of firefighting water in periods of drought.

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 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 in some circumstances, 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 impellors 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^{o}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. Recommendations for cold weather

7.1 In winter, the temperature of stored water supplies and feed pipes should be maintained no lower than 4ºC to prevent freezing and associated damage to the installation.

7.2 Where it can be foreseen that the ambient temperature may descend below 4ºC 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 4ºC where electric pumps are employed and not below 10ºC where diesel pumps are utilised.

7.5 The area where the main stop valves are located should not be allowed to fall below 4ºC.

7.6 In the case of fixed fire suppression systems, an assessment should be made of the potential benefits of modifying the system to become an 'alternate' installation configured to be dry or free of water during the cold months of the year.

7.7 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.

7.8 Check batterie levels on fire-safety equipment, if cold temperature occur.

7.9 If special there is a special extinguishant at use, check its reliability at cold temperatures. (most of them work till -15°C)

8. Measures to minimise the scale of a fire

In the event of 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 again reduces 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.

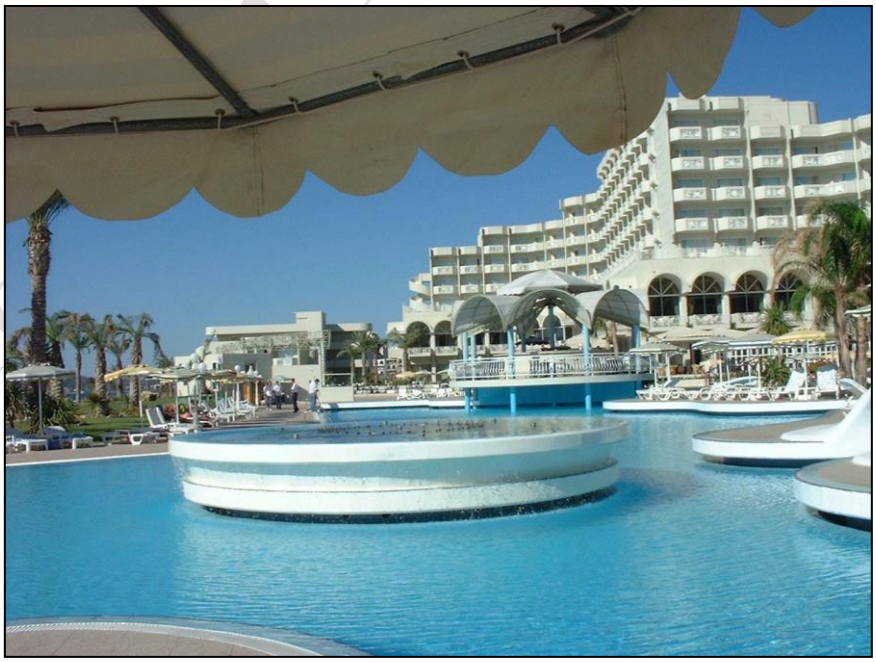

Figure 4: An emergency water supply

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 suspensions, sand grit and stones, find their way into the fire suppression system, but there is a potential life safety hazard in that legionella could develop.

9.2 In addition to the water supplies for automatic fire suppression systems, the quality of the water feeding and 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 assay 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 their 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 in to 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. Other 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.