European Guideline

CFPA-E No 7: 2021 N

Demountable and mobile flood protection systems

Recommendations on planning, selection, procurement and using

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
CFPA Europe

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Content

Key words: flood, demountable and mobile protecting system, functional characteristics, criteria for selection, quality assurance

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, flood events of recent years have shown that significant damage can occur due to flooding. A flood can also seriously endanger the existence of many companies because of a prolonged business interruption and potential loss of market share.

According to experience, losses caused by flooding can be significantly limited by preventive measures. In this context, exceptionally well-designed and detailed fixed protective measures have proven successful. Furthermore, demountable and mobile protection systems can complement or replace stationary protection systems when using preinstalled systems is impossible because of operational or areal constraints.

In this connection, existing hazards must be identified and analysed, and the associated risks assessed for establishing appropriate protection measures. The relevant objectives, e. g., the height of the protecting wall, are defined as object-related and depending on the legal requirements and risk assessment.

Object-related protection measures should be interoperable with local protection concepts by coordination because floods are usually large-scale events. Site- and object-related efforts can only be practical if embedded in the local protection concepts. Potential threats to the stability of buildings by buoyancy or groundwater percolation are also to be considered.

2. Scope

The present guideline covers the planning, selection, procurement, and of mobile flood protection systems. Mobile flood protection systems are currently widely available on the market. The approval test of these systems is, however, still according to different criteria and by various methods. For this reason, notes, and typical criteria for the selection of suitable mobile flood protection systems are systematically prepared as recommendations in order to support the decision-makers, planners, and managers of flood protection to take appropriate measures in practice.

This publication is based on current knowledge and previous experience of loss prevention and risk management. It will be reviewed regularly and updated when there are significant improvements resulted that in the specified fields.

Legal regulations are not affected.

3. Definitions

Stationary flood protection systems: structural protective measures that are mainly ready without foreign action and so ensure their full protective effect permanently

Note: An online catalogue of flood-resistant construction types has been published in Germany with the research report and additional explanation for practice to make flood-adapted planning and construction more concrete for the first time, based on current research results:

https://www.gdv.de/de/themen/politische-positionen/schadenverhuetung/service.

Mobile flood protection systems can be divided simplified as follows:

- Well-planned systems that are transported and assembled in case of application to the site. The installation of these systems requires physical provision on-site.
- Standard emergency systems that are marketed and assembled without physical provision on-site.

Stationary systems with movable elements, which are activated in case of application, can be assigned to mobile systems within the meaning of this guideline.

4. Examples of available systems

Mobile flood protection systems can be designed and used both for the protection of areas and the protection of individual objects, e. g. fitted in building openings (doors, gates, driveways). Following typical mobile flood protection systems are listed without any claim to completeness. They are briefly described with schematic illustration and by the following characteristics:

- basic structure
- area of application and
- Logistics and Maintenance.

With these characteristics, the selection of a locally appropriate protection system in practice should be supported.

Note:

- *The selection of an appropriate protective system should be based on the risk identification and assessment for the site and object to be protected. In this connection, the design flood and its event characteristics must be considered. Typical features of the design flood are e. g., cause of an event, specific flood duration, the velocity of water, ground conditions, condition of building envelope, duration between flood alarm and water reaching site, ensuring water tightness with adjacent objects.*

- *As part of the site- and object-related risk assessment, associated measures, e. g., soil improvement also due to the possible infiltration through the ground and event-specific organizational measures, including the potential need for protection against sabotage, and existing controls, e.g., emergency response planning, should be included. In addition, the suitability of mobile flood protection systems must be tested and proved for the intended purpose, which may have very different application conditions. Standard methods for approval tests are developed to classify the mobile flood protection systems based on parameters listed in this guideline (see VdS 3855).*

- Floating barrier systems

  Basic structure: Floating barrier systems consist of underground flood chambers, which are connected to the waters above through pipes or channels and wall elements or sections that rest in the chamber. The individual elements of the flood protection wall are formed as a floating body. In case of flood, they can either float vertically or lift themselves.

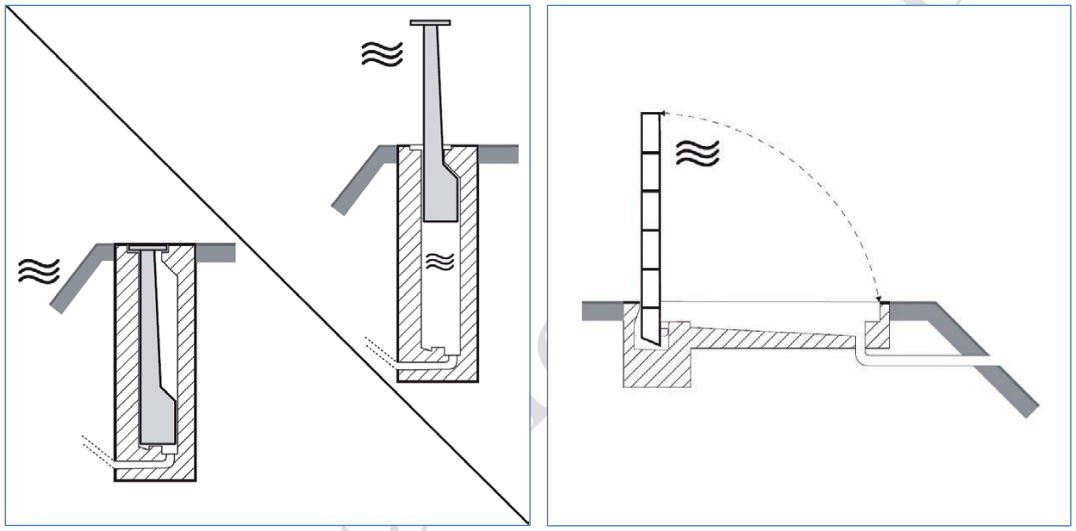

Figure 1 Examples of Floating barrier systems

  Area of application: These systems can be used to protect passages - such as dikes, walls, or between buildings. Individual elements can be longer than ten meters and combined into longer walls. With such systems, a level of protection of several meters can be realized.

  Logistics and Maintenance: Due to the stationary installation, logistics is not required. The cost of maintenance is, however, quite high, among other things for the removal of sediments in the flood chamber, eliminating of icing, pumping of rainwater, corrosion protection.

- Dam beams or board stop log systems

  Basic structure: These systems consist of the one hand of wall elements, which are designed as stackable dam beams or dam boards. On the other hand, columns serve as a counter bearing for the horizontally stacked beams or the lined boards. To accommodate the horizontal forces, the mobile columns are force-fit connected by means of foundation with the ground, e. g., with anchor plates, bolt, or bolts.

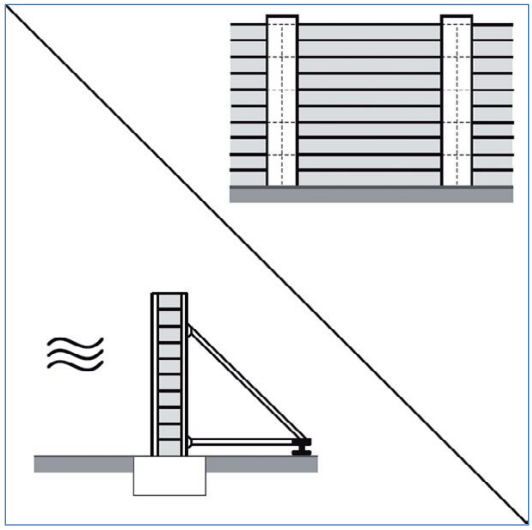

Figure 2 Dam beams or dam board stop log systems

Area of application: These systems are suitable both as area flood control systems in the field of open spaces as well as for use in the passage between buildings or other stationary flood control facilities. With such systems, a level of protection of several meters can be realized. The distance between columns is usually several meters. With the increasing level of protection, additional supports may be required.

Logistics and Maintenance: Before and after the use, adequate storage capacity for the columns and stop log elements and seals are required. In case of use, it must be ensured that the right elements are used in the right place by orderly logistics for removal from storage, transport, and installation on site (integration in an alarm plan).

- Folding systems (possibly with impact protection)

  Basic structure: These systems consist of individual plate-shaped segments merged by rigid foot parts or connected by plastic tarps. They are swing opened in case of use at the site or lift themselves with the incoming water. A tear-resistant and watertight blanket at the edges of the segments forms a flexible joint and seals the joints between the neighbouring segments. They may need to be fixed in the ground by earth screws or anchors. In permeable substrates, preinstalled concrete aprons with connection profiles and plastic sheeting that incorporated into the soil may be necessary to prevent undercurrent through the ground.

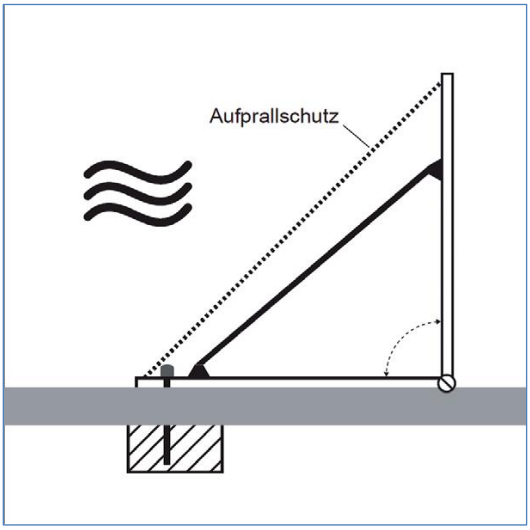

Figure 3 Example of folding systems

Area of application: Folding systems require substantially flat mounting surfaces; terrain slopes are tolerable to some degree. Individual barrier elements can be joined together to longer wall sections, or individual passages between buildings, or stationary facilities can be sealed.

Logistics and Maintenance: Regarding the logistics and maintenance, preinstalled folding systems are comparable with floating barrier systems and systems with partly or entirely mobile components with dam beams or board stop log systems.

- Sandbag systems

Basic structure: Sandbags are made of jute or plastic and can either be filled with sand or grit. When using, note that the bags are filled only to ⅔, and the filling opening are placed opposite the waterside. Filled sandbags can have a weight of about 12 to 20 kg. To improve the seal on the waterside, plastic sheets also be placed.

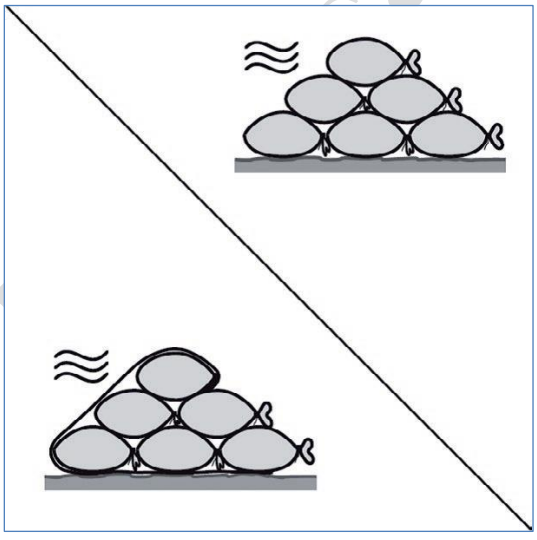

Figure 4 Example of sandbag systems

Area of application: Sandbags can be stacked mound-like without further assistance by hand. Their applications are many, e. g. door or window openings, light wells, driveways, but also entire streets can be protected through dams of any length. In addition, sandbags are used to secure dike, to increase the protection level of existing levees or walls, or in combination with other protection systems, such as the bock systems.

Logistics and Maintenance: Shall sandbag systems extensively used for, e. g. as the construction of dams, a large number of workers for filling and subsequent distribution to the dam construction is necessary. For faster filling of sandbags filling-aid, e. g. sandbag hopper and other filling machines have proven.

After a flood event, it must be decided on the basis of pollution levels. What happens to the sandbags? If they are contaminated with oil or chemicals, for example, they must be professionally cleaned or disposed of. Otherwise, pre-filled sandbags should be stored dry and protected from the weather.

- Container systems (filled with water or sand)

Basic structure: Open container systems strung together to form a protective barrier. They can be filled with water or sand. The outer sheath for systems filled with sand can consist of tear-resistant geotextile fabric and for systems filled with water from reinforced PVC. In addition, there are also systems made of fiberglass reinforced plastic panels with a plastic sheet that be rolled into cylinders and closed with a simple system.

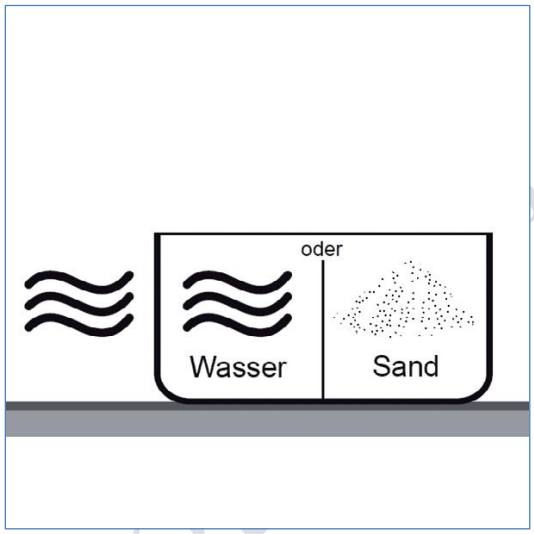

Figure 5 Example of container systems

Area of application: With container systems, dams of any length can be constructed. In general, the tightness in the coupling areas between containers is already given by the pressure of the filled containers, or they may need to connect each other in the site, e. g. by screw. If it fits on the dimension, gateways or wall openings can be locally sealed with the container systems. With container systems, a protection level of about 0.5 to 2 m can usually be achieved. Container systems can possibly be used in rough terrain since no heavy tools are required for their construction and transport.

Logistics and Maintenance: Depending on the type of system, e. g., with or without a frame, the required space for storage is very different. Also depending on the type of container systems and their parts can be reused. When reusing the system, its elements must be emptied, cleaned, if necessary, and dried.

- Bock systems

  Basic structure: These systems are essentially composed of three components: Support construction, wall elements (e. g. Euro pallets or metal plates.), and plastic seal sheets. To fix the support structure on the ground, nails or anchor bolts are used. On the support structure, the wall elements are assembled and fixed to the ground with sandbags; the seal sheets are placed on the waterside of the wall elements.

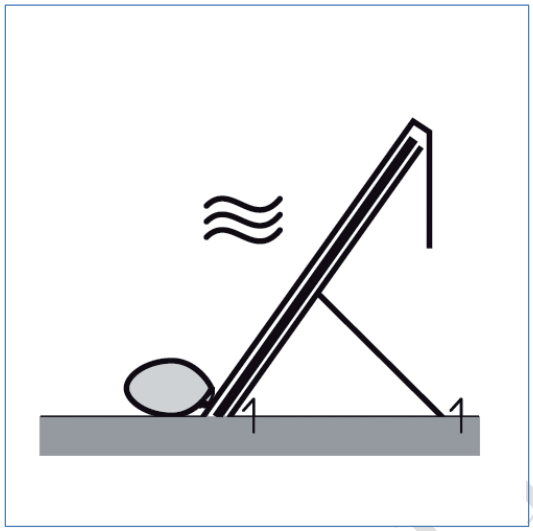

Figure 6 Example of Bock systems

Area of application: Bock systems can be used for the protection of area, or objects. With Bock systems dams of any length and, depending on the type of system, a protection level of up to 1.5 m can be achieved. Systems with Euro pallets are quite inflexible in length due to the unit width of each palette. To ensure the stability of Bock systems, the ground must be stable and relatively flat; using on soft ground is not recommended.

Logistics and Maintenance: To ensure a rapid installation of bock systems, systematic logistics with orderly storage is necessary. After using, bock systems must be controlled, cleaned, dried, and can be reused subsequently.

- Hose systems (filled with water, sand, or air)

  Basic structure: Hose systems are based on the same principle: tubular or trapezoidal plastic containers are filled with water, sand, or air. They get their stability through the ground plane on the waterside. By water-filled systems with a circular cross-section two hoses shall be laid side by side in parallel and interconnected, so they do not roll away by the water pressure of the floods. Their use is however, problematically in frost. Freeze the water body in the tubing problems of stability can be caused.

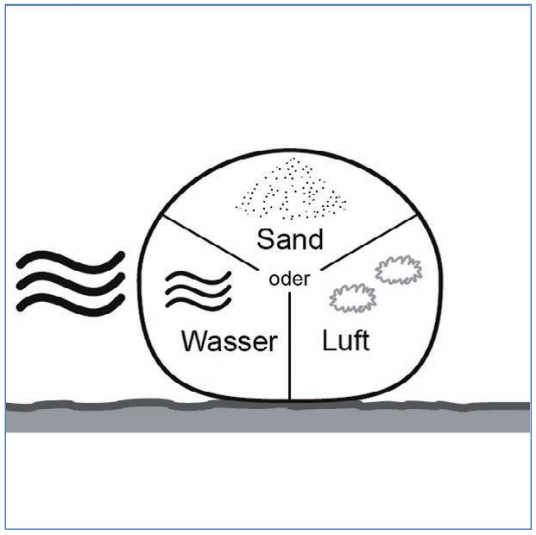

Figure 7 Hose systems

Area of application: Hose systems can very well fit the topography due to their flexibility and can be used under different ground conditions. With hose elements coupled to each other with cuffs, dams of any length for protection of area and protection level of up to 1.5 m can be achieved. Furthermore, the protection level of existing dikes provided sufficient stability, can be increased by hose systems. The flexible outer shell of the hose also allows the local sealing of passage for driveways or wall openings.

Logistics and Maintenance: After using, the hoses must be emptied and dried, and examined for cracks and abrasions and repaired if necessary. Subsequently, hose systems can be reused.

- Other systems

  As other systems, among other things, even provisional systems, for example, board or precast concrete structures, may be called. These systems can be quickly provided with materials that are available on sites, e.g., on construction sites and building materials storage areas. Provisional systems are due to the lack of systematic dimensioning not recommended and therefore not described here.

- Mobile backflow protection

  Basic structure: These systems are, on the one hand, inflatable sealing elements that are introduced and inflated into existing sewer openings, and on the other hand, prefabricated, adjusted sheets or plates in customized degrees.

  Inflatable sealing elements are available as:

  - shut-off disks
  - shut-off bubbles
  - sealing bags
  - shaft sealing bags and
  - inflatable plug for pipelines.

  The elements are a combination of rubber bubbles with metallic lines or valves for inflation. They are available in different sizes. It is recommended to pre-determine the required sizes and quantity of the needed systems and to procure and provide these.

For shafts, there are prefabricated panels with screws and fasteners. These are available for purchase in certain sizes or are individually made, usually of metal.

Area of application: Mobile backflow protection systems are used to seal manhole covers, processes, pipes, and opening of shafts.

Logistics and Maintenance: All mobile backflow protection systems are prefabricated elements and delivered as planned. Only the plug for sealing pipes is to be foreseen as an emergency measure. When creating protection concepts, stationary backflow protection systems are to be preferred. This is definitely required when wastewater must be discharged during the flood.

5. Functional characteristics as criteria for selection of systems

Apart from the costs for acquisition and operation, mobile flood protection systems differ among others, with respect to the structure, permissible application areas, and the need and expense for the logistics and maintenance. Simplified, these functional characteristics as evaluation criteria are divided into the following topics:

- Type of System
- Scope of application: Applications or system limitations according to the testing and approval, e. g. maximum water level
- Material: Susceptibility to frost, resistance to saltwater, and UV-radiation
- Statics: Integrity and load capacity, stability (e.g., resistance against flotsam or mechanical effects, susceptibility to vandalism)
- Tightness: Test methods and allowable leakage, compensate for uneven surfaces and soil bearing capacity
- Costs (Reference base L x H = 100 m x 1 m): life, reuse or disposal, necessary structural conditions, and additional costs for these
- Operation expense (Reference base L x H = 100 m x 1 m): time, devices, people, and manual, and training for installation
- Expenses for maintenance after use: needed time, devices, and number of people
- The expense for periodic maintenance: Time, devices, number of people, and other, e. g. additional measures to protect against feeding animals
- Logistics: the weight of typical individual elements, maximum dimensions of the standard system, necessary capacity required for storage (e. g. per 100 m), storage outdoor or protected indoor, necessary transport capacity
- References (e. g. practical assignments and also in the sense of product liability protection).

In the appendix of this publication, the user finds a basis for the comparison review of sandbags. The choice of the example falls on sandbags because they already tested for many years in mobile flood protection and are also independent of the manufacturer.

6. Operational experiences

The preparation and explanation of the functional characteristics as criteria for selection have clearly shown that the use of mobile flood protection systems should be practiced regularly because the participating institutions and operation personnel must be attuned to each other, despite in-depth planning. This also applies to the head of operations, including ensuring the communication in case

of failure of mobile networks and to the logistics. The timely and proper set up of the mobile protection systems therefore presupposes ahead, inter alia, the following:

- The application site, e. g. the access road, is shut off over a wider area as possible and clearly visible properly signposted. According to experience a shutting off single lanes has shown insufficient
- Entrances to the operation site are guarded during the duration of operation, e. g., by trained security personnel that can authenticate by
- The traffic should be redirected via large-scale route diversion, and redirection is clearly visible to mark and to announce the press
- The required capacity of logistics should be constantly kept ready, if necessary, via binding contracts
- The required material and the corresponding storage are each to mark clearly and legibly
- Drive and walkways in the storage are also to mark clearly and visibly
- The Tool with the required functional characteristics, such as ladder and rolling scaffolding up to a working height of 3.5 m, and substitute material such as screws are to provide in a sufficient number
- The operation personnel must be introduced uniformly and thoroughly; especially the Interaction between logistics and the set up should be practiced sufficiently
- The operation personnel is to inform about the current water levels that should also be visualized in the exercise.
- The operation personnel should carry necessary protective equipment, such as helmets, safety vests. They are sufficient to provide.
- The supply of the teams on site is to ensure during the entire operation. The ways of supply should be as short as possible.

According to experience, it is useful for the implementation of practice to define a realistic scenario and to inform residents in time, e. g. with the help of the press and information signs and banners at the site and its entrances.

7. Quality assurance measures

The protective functions of mobile flood protection systems in case of use will be determined significantly by the systems' properties on the one hand and correct assembly on the other hand.

7.1 Verification of suitability and their assessment

The required characteristics of mobile flood protection systems, such as the stability and tightness depending on the water pressure and resistance to mechanical impacts, must – like with all other security-related products – always be proved by the tests of prototypes related to approved methods and procedures.

7.2 Declaration of the manufacturer

Mobile flood protection systems can have different properties for the area and object protection. To support the choice of appropriate protection systems for local conditions in practice, manufacturers should provide all functional characteristics as information for the user.

7.3 Operating precautions for proper use

For the use of mobile flood protection systems, sustainable maintenance of the components and solid operational and logistics planning is always required.

The emergency response plan must contain reporting chains, required warning, mobilization times, and define of necessary personnel, e. g. for set up, and transportation capacity.

As far as interfaces consist of flood protection measures in the public sector, it must be ensured that the effects of changes in a public area are recognized and taken into account the object-related protection system. This can be, for example, hydraulic engineering measures on waters (including dams, bridges, and retention areas), changes in the neighbourhood in terms of surface drainage and development. or changes to flood control measures in public ownership.

8. Literature

Gesamtverband der Deutschen Versicherungswirtschaft e. V. / Hochwasser-Kompetenz-Centrum
"Mobile Hochwasserschutzsysteme; Hinweise für die Beschaffung, den Einsatz und die Bereitstellung " (VdS 6001)
http://vds.de/fileadmin/vds_publikationen/vds_6001_web.pdf

Online-catalogue on flood-resistant ceilings and exterior walls:

https://www.gdv.de/de/themen/politische-positionen/schadenverhuetung/service

Österreichischer Wasser- und Abfallwirtschaftsverband (ÖWAV)
Mobiler Hochwasserschutz (ÖWAV-Arbeitsbehelf 42)
ÖWAV, 1010 Wien, Marc-Aurel-Straße 5, 2013

VdS Loss prevention limited
VdS 3855: VdS-Guideline on flood protecting systems; stationary and mobile flood protecting systems (publication in preparation)

VdS Loss prevention limited, Cologne, Amsterdamer Str. 172-174

European Guideline

9. Appendix: Functional characteristics of sandbag systems (of jute or plastics) - An example of the system assessment

Systems Characteristics	Sandsack (jute)	Sandsack (plastic)
Company		
Area of application		
(a) Area or property protection	Area and property protection	Area and property protection
(b) Capabilities and system limit	In dikes, a maximum height of about 2 mcan be reached	In dikes, a maximum height of about 2 mcan be reached
Material		
(a)Basic material	Jute, filling material: sand, Split	Plastic, filling material: sand, Split
(b) Susceptibility to frost		
(c) Salt water / UV resistance		UV stabilized or UV-resistant
Permissible water level		
Static		
(a) Stability and bearing capacity (Domino effect)	When applying the correct stacking technique in dike construction may have rather high stability. Jute bags interlock well even when wet.	Lower stability than jute bags as increased hzard of slipping.
(b) Stability (eg resistance to flotsam and mechanical effects)		
(c) Vulnerability to vandalism	Sandbags can be removed from the dam.	Sandbags can be removed from the dam.
Tightness		
(a) Test methods and allowable leakage?	As a result of swelling of jute bags in contact with water tightness is increased, but not 100% tightness.	Not 100% tightness.
(b) Compensetion of uneven ground and soil bearing capacity	Sandbags nestled on uneven ground.	Sandbags nestled on uneven ground.
Costs		
a) Cost (Procurement) per opening or L x H = 100 mx 1 m	Jute bags without filler: 3.600 € (14,000 jute bags (sales promotion, 2004) à € 0.40) Costs filler: € 3,150 (15 kg of sand per sack, 1 t of sand à 15 €) Cost filled burlap sacks: € 8750	Plastic bags without filler 2,800 euros (about 14,000 plastic bags (sales promotion, 2004) à € 0.20) Costs filler: € 3,150 (15 kg of sand per sack, 1 t of sand à 15 €) Cost filled plastic bags: € 5,950
(b) Life time	Usually, only mission	Several missions possible.
(c) Reuseablility or disposal	Generally not reusable because wet jute bags rot quickly. When contamination by contact with oil, etc., proper disposal is necessary. Otherwise Jute is a natural material and can easily be disposed of.werden.	In general, reusable.
(d) Necessary structural requirements (Addition costs)	No	No
Effort for installation per opening or for length x height = 100 mx 1 m		
(a) Time	3 hours	3 hours
(b) Equipments	48 truck for transport, about 8 forklift truck for loading and unloading.	48 truck for transport, about 8 forklift truck for loading and unloading.
(c) Persons	50	50
(d) Guidance / training for installation	"Please note: - Fill sandbags only 2/3 so they nestle when laying on rough - Filling opening opposite the water side - - Observe the stacking technique depending on the application - Use of foil can also protect against the leakage of water	"Please note: - Fill sandbags only 2/3 so they nestle when laying on rough - Filling opening opposite the water side - - Observe the stacking technique depending on the application - Use of foil can also protect against the leakage of water
Efforts for maintenance after use		
(a) Time	"No maintenance required, since usually only used for one mission. If the sack is to be reused, the sand must be removed and the bag is completely dry. ".	Bags must be dried after use
(b) Equipments		
(c) Number of person		
Regular maintenance		
(a) TIme		
(b) Equipments		
(c) Number of persons		
(d) Other, e. g. additional measures to protect against feeding animals	Jute sandbags can be pre-filled poorly stored, since the moisture of the sand alone can lead to a decay process after a short time. Are the bags once wet, they must be dried. Therefore, regular maintenance is filled and stored bags is necessary.	Plastic bags prefilled can be quite easily stored at proper storage over long periods
Logistic		
(a) Net weight of typical individual elements	Filled sandbag, dry: 15 kg Filled sandbag, wet: 20 kg	Filled sandbag, dry: 15 kg Filled sandbag, wet: 20 kg
(b) Storage place: Outdoors or protected against weather	Protected against weather and light, store away from direct sunlight and dry.	Protected against weather and light, store away from direct sunlight and dry.
(c) Max. Dimensions of standard system	Sandbag empty: 35 x 70 cm Sandbag filled: 25 x 50 x 8 cm	Sandbag empty: 35 x 70 cm Sandbag filled: 25 x 50 x 8 cm
(d) Space for storage per opening protection or L x H = 100 mx 1 m	One euro pallet (1.20 mx 0.80 m): 50-70-filled sacs For dike L x H = 100 m x 1 m: 200-280 euro pallets needed, corresponding to an area of 192-269 square meters.	One euro pallet (1.20 mx 0.80 m): 50-70-filled sacs For dike L x H = 100 m x 1 m: 200-280 euro pallets needed, corresponding to an area of 192-269 square meters.
(d) Transport capacity	One truck respectively 5-ton carry capacity: 300 filled sandbags	One truck respectively 5-ton carry capacity: 300 filled sandbags
Certification		
Practical application	Elbe flood, August 2002 Flood Krems, August 2002 Flood Dresden, April 2006 Oder flood, May 2010	Elbe flood, August 2002 Flood Krems, August 2002 Flood Dresden, April 2006 Oder flood, May 2010

Origin source: VdS 6001

European Guideline

Systems Characteristics	Sandsack (jute)	Sandsack (plastic)
Company		
Area of application		
(a) Area or property protection		
(b) Capabilities and system limit		
Material		
(a)Basic material		
(b) Susceptibility to frost		
(c) Salt water / UV resistance		
Permissible water level		
Static		
(a) Stability and bearing capacity (Domino effect)		
(b) Stability (eg resistance to flotsam and mechanical effects)		
(c) Vulnerability to vandalism		
Tightness		
(a) Test methods and allowable leakage?		
(b) Compensetion of uneven ground and soil bearing capacity		
Costs		
a) Cost (Procurement) per opening or L x H = 100 mx 1 m		
(b) Life time		
(c) Reuseablility or disposal		
(d) Necessary structural requirements (Addition costs)		
Effort for installation per opening or for length x height = 100 mx 1 m		
(a) Time		
(b) Equipments		
(c) Persons		
(d) Guidance / training for installation		
Efforts for maintenance after use		
(a) Time		
(b) Equipments		
(c) Number of person		
Regular maintenance		
(a) TIme		
(b) Equipments		
(c) Number of persons		
(d) Other, e. g. additional measures to protect against feeding animals		
Logistic		
(a) Net weight of typical individual elements		
(b) Storage place: Outdoors or protected against weather		
(c) Max. Dimensions of standard system		
(d) Space for storage per opening protection or L x H = 100 mx 1 m		
(d) Transport capacity		
Certification		
Practical application		

Origin source: VdS 6001

10. Guidelines

Fire

Guideline No. 1:2015 F - Fire protection management system
Guideline No. 2:2013 F - Panic & emergency exit devices
Guideline No. 3:2011 F - Certification of thermographers
Guideline No. 4:2010 F - Introduction to qualitative fire risk assessment
Guideline No. 5:2003 F - Guidance signs, emergency lighting and general lighting
Guideline No. 6:2011 F - Fire safety in care homes for the elderly
Guideline No. 7:2011 F - Safety distance between waste containers and buildings
Guideline No. 8:2004 F - Preventing arson – information to young people
Guideline No. 9:2012 F - Fire safety in restaurants
Guideline No. 10:2008 F - Smoke alarms in the home
Guideline No. 11:2015 F - Recommended numbers of fire protection trained staff
Guideline No. 12:2012 F - Fire safety basics for hot work operatives
Guideline No. 13:2015 F - Fire protection documentation
Guideline No. 14:2007 F - Fire protection in information technology facilities
Guideline No. 15:2012 F - Fire safety in guest harbours and marinas
Guideline No. 16:2008 F - Fire protection in offices
Guideline No. 17:2015 F - Fire safety in farm buildings
Guideline No. 18:2013 F - Fire protection on chemical manufacturing sites
Guideline No. 19:2009 F - Fire safety engineering concerning evacuation from buildings
Guideline No. 20:2012 F - Fire safety in camping sites
Guideline No. 21:2012 F - Fire prevention on construction sites
Guideline No. 22:2012 F - Wind turbines – Fire protection guideline
Guideline No. 23:2010 F - Securing the operational readiness of fire control system
Guideline No. 24:2010 F - Fire safe homes
Guideline No. 25:2010 F - Emergency plan
Guideline No. 26:2010 F - Fire protection of temporary buildings on construction sites
Guideline No. 27:2011 F - Fire safety in apartment buildings
Guideline No. 28:2012 F - Fire safety in laboratories
Guideline No. 29:2013 F - Protection of paintings: Transport, exhibition and storage
Guideline No. 30:2013 F - Managing fire safety in historical buildings
Guideline No. 31:2013 F - Protection against self-ignition and explosions in handling and storage of silage and fodder in farms
Guideline No. 32:2014 F - Treatment and storage of waste and combustible secondary raw materials
Guideline No. 33:2015 F - Evacuation of people with disabilities
Guideline No. 34:2015 F - Fire safety measures with emergency power supplies

Natural hazards

Guideline No. 1:2012 N - Protection against flood
Guideline No. 2:2013 N - Business Resilience – An introduction to protecting your business

Guideline No. 3:2013 N - Protection of buildings against wind damage
Guideline No. 4:2013 N - Lightning protection
Guideline No. 5:2014 N - Managing heavy snow loads on roofs
Guideline No. 6:2015 N - Forest fires

Security

Guideline No. 1:2010 S - Arson document
Guideline No. 2:2010 S - Protection of empty buildings
Guideline No. 3:2010 S - Security system for empty buildings
Guideline No. 4:2010 S - Guidance on key holder selections and duties
Guideline No. 5:2012 S - Security guidelines for museums and showrooms
Guideline No. 6:2014 S - Emergency exit doors in non-residential premises