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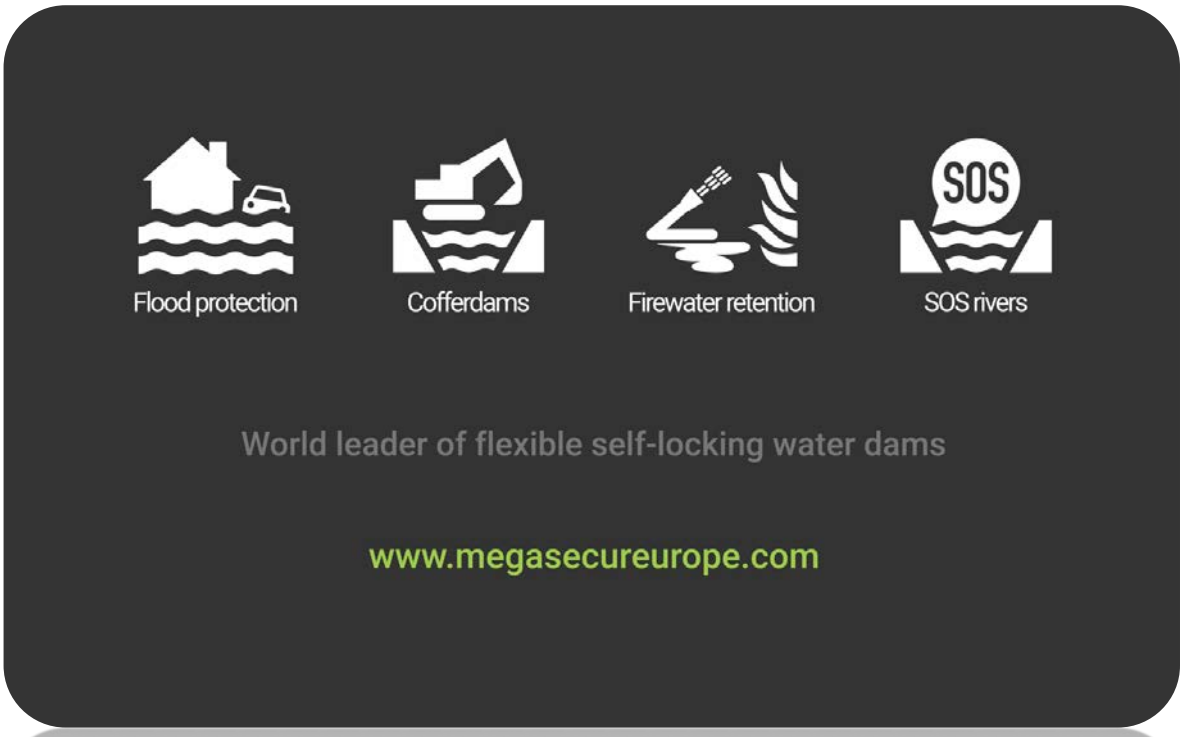
Emergency flood protection
Water-Gate© flexible dams



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SARL au capital de 100 000 €
RCS ARRAS 532 063 526 00018 | N° de TVA : FR 09 532 063 526

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The world leader in self-securing flexible dams

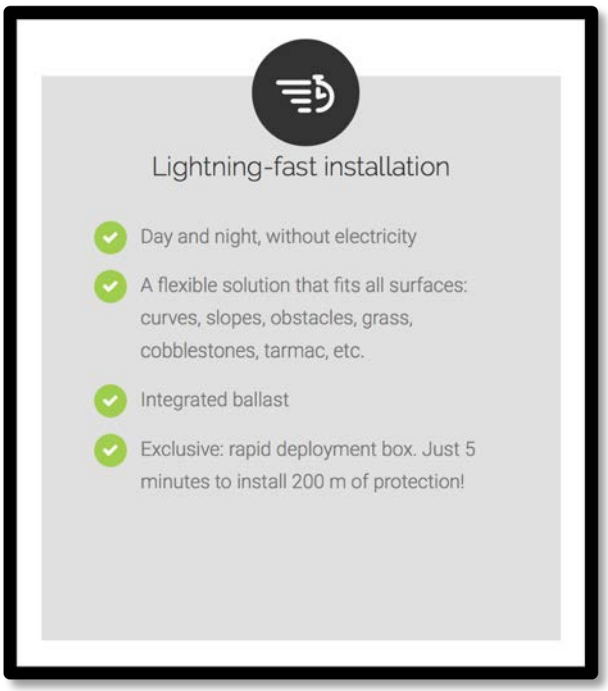
FM APPROVED
WL-39,50,60 series

1 THE ADVANTAGES OF WATER-GATE©

1.1 Install flood protection in record time!

Lay it down, unroll it, and rest the ends on a support. Water rushes into the dam and holds it in place against the ground.

- The retention dam is self-securing.
- Moulded hydrodynamic ballast. The containment barrier does not slip when faced with a sudden influx of water and remains stable regardless of the direction of the current.
- Can retain up to 2 m of water!
- To remove the dam, simply lift it using the back loops and hang it on a vertical wall to be pressure-washed.



1.2 The protection system can be deployed 24/7, with or without electricity

- Emergency situations are not the time for complex deployment procedures. Simple installation is the key to a successful response. This system can be deployed 24/7.

1.3 A "100% flexible" solution for unbeatable storage size

The protection device requires minimal packaging thanks to the use of flexible waterproof materials.

- A roll the size of a sports bag can retain thousands of m^3 of water with incredible efficiency.
- Rapid deployment boxes for longer lengths.
- Can be stored much closer to the front line.

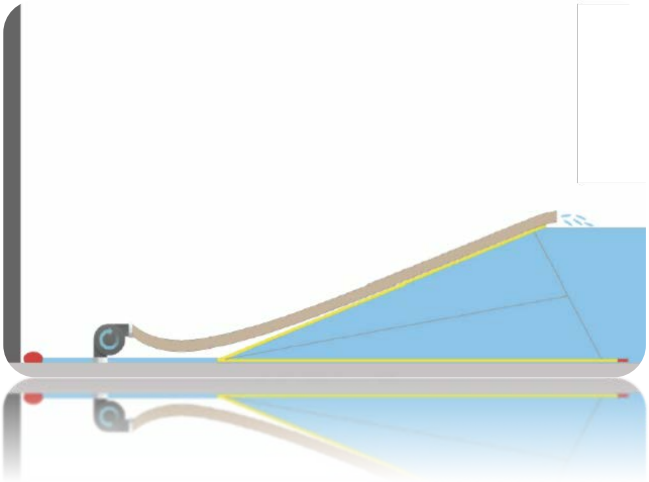
1.4 A lightweight and flexible solution that fits all sites

Whatever the surface (concrete, tarmac, earth, rubble, etc.) and relief (slopes, edges, obstacles, etc.), Water-Gate can be installed in any direction without anchorage.

- Its flexibility allows it to form a snug fit with any type of terrain. The only real constraint is its ground coverage (1.4 m ground depth for a protection height of 35 cm).

- Modular protection available in both 9 m and 15 m sections. These can be linked to form a barrier of any length, and different heights can also be combined. Sections can be fastened to each other using the Velcro connectors.

- Amazing watertightness:
  Depending on the condition of the surface and the water level (hydrostatic pressure), the leak rate varies from 2 l to 6 l per linear metre per minute.
  Water seeps through, but the barrier's compartments hold back any sand and sludge.
  - Watertightness +
    In the case of dry installation, it is possible to reduce this leak rate by 5 to 10 times.
  - Double retention curtain
    Any water that has seeped through can be channelled and pumped back to the flooded side.

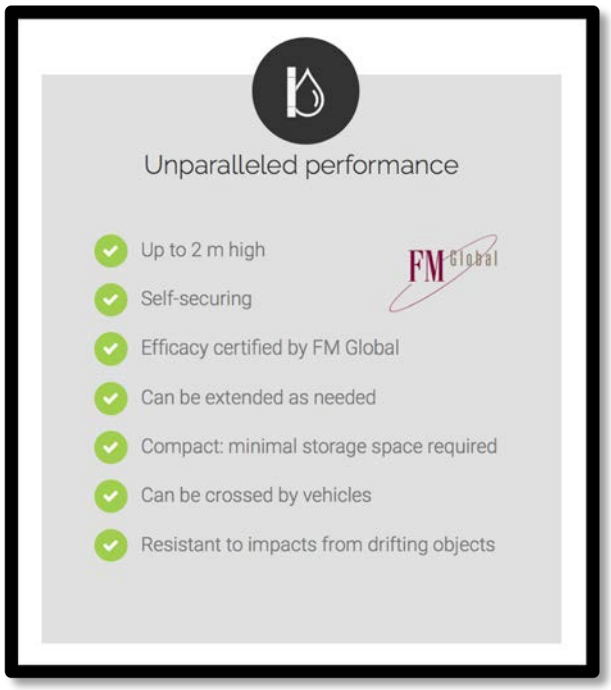


1.5 Vehicles can cross the barrier, even after flooding has already begun

- Water-Gate© protection barriers that are already in water can be crossed by work or emergency vehicles up to mid-axle height without any special precautions.

1.6 Exceptional resistance

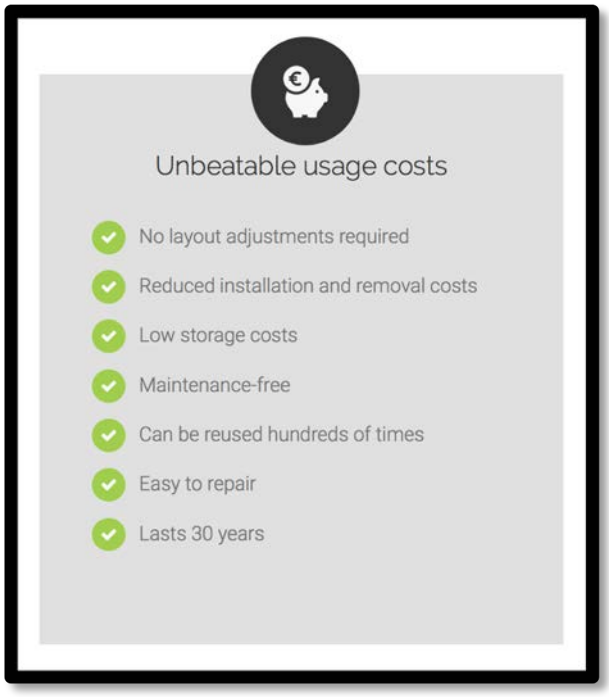
- Water-Gate containment barriers can be used hundreds of times. The PVC makes the woven polyester extremely resistant to abrasion. The use of Water-Gate for river works shows that the dams can be used on uneven surfaces for several years.
- The device's resistance to impacts from falling and drifting objects has been tested by the US Army Corps of Engineers.
- If the fabric does get torn, the user can simply intervene on the flooded side to stop the leak and repair the dam with glue once it has dried out.



US Army Corps of Engineers

1.7 UNBEATABLE all-round protection costs

- ✓ **Highly competitive purchase price per linear metre**
- ✓ No maintenance required, therefore reducing the risk if the device is used multiple times (no pumps to look after)
- ✓ Low storage costs
- ✓ Low risk of theft, unlike metal devices
- ✓ Unbeatable installation costs
- ✓ Can be reused hundreds of times
- ✓ Easy to repair



FM Global

2 EXPRESS PROTECTION/DIVERSION KITS (<50 KG)

These dams are easy to handle and can be unrolled by a single person

WL 0617 (15 cm x 5,2 m) :
- Maximum water retention height: 15 cm
- Protection length: 5,2 m
- Width (depth of ground surface): 60 cm
- Packaging: W 42cm x L 30cm x H 28cm
- Weight: 14,0 kg

WL 0630 (15 cm x 9,1 m) :
- Maximum water retention height: 15 cm
- Protection length: 9.1 m
- Width (depth of ground surface): 60 cm
- Packaging: W 40 cm x L 38 cm x H 28 cm
- Weight: 19.4 kg

WL 0650 (15 cm x 15,2 m) :
- Maximum water retention height: 15 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 60 cm
- Packaging: W 45 cm x L 75 cm x H 29 cm
- Weight: 29.8 kg

All Water-Gate dams can be connected to each other regardless of their height, with the exception of the WL0630 and WL0650 dams, which can only be connected to dams of the same height (15 cm).

WL 1430 (35 cm x 9,1 m) :
- Maximum water retention height: 35 cm
- Protection length: 9.1 m
- Width (depth of ground surface): 140 cm
- Packaging: W 37 cm x L 106 cm x H 29 cm
- Weight: 24kg

WL 1450 (35 cm x 15,2 m) :
- Maximum water retention height: 35 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 140 cm
- Packaging: W 49 cm x L 108 cm x H 33 cm
- Weight: 39.7 kg

WL 2030 (50 cm x 9,1 m) :
- Maximum water retention height: 50 cm
- Protection length: 9.1 m
- Width (depth of ground surface): 200 cm
- Packaging: W 44 cm x L 74 cm x H 29 cm
- Weight: 30.4 kg

WL 2050 (50 cm x 15,2 m) :
- Maximum water retention height: 50 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 200 cm
- Packaging: W 58 cm x L 76 cm x H 38 cm
- Weight: 50.2 kg

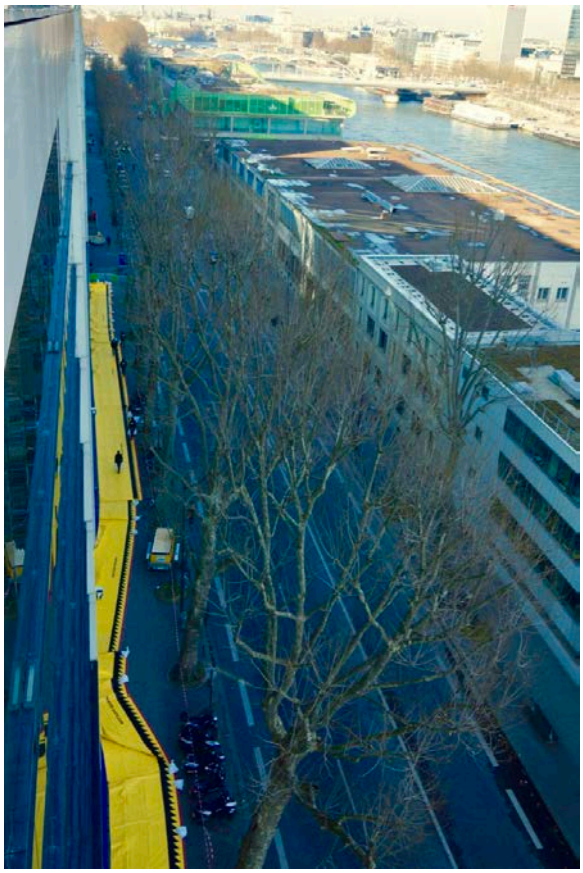
3 HIGH FLOOD PROTECTION

WL 2630 (66 cm x 9,1 m) :
- Maximum water retention height: 66 cm
- Protection length: 9.1 m
- Width (depth of ground surface): 264 cm
- Packaging: W 44 cm x L 102 cm x H 31 cm
- Weight: 38.6 kg

WL 2650 (66 cm x 15,2 m) :
- Maximum water retention height: 66 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 264 cm
- Packaging: W 54 cm x L 106 cm x H 34 cm
- Weight: 62.9 kg

WL 3230 (81 cm x 9,1 m) :
- Maximum water retention height: 81 cm
- Protection length: 9.1 m
- Width (depth of ground surface): 324 cm
- Packaging: W 56 cm x L 84 cm x H 41 cm
- Weight: 62.5 kg

WL 3250 (81 cm x 15,2 m) :
- Maximum water retention height: 81 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 324 cm
- Packaging: W 66 cm x L 84 cm x H 51 cm
- Weight: 104.0 kg



WL 3930 (100 cm x 9,1 m) :
- Maximum water retention height: 100 cm
- Protection length: 9.1 m
- Width (depth of ground surface): 396 cm
- Packaging: W 56 cm x L 116 cm x H 41 cm
- Weight: 76.8 kg

WL 3950 (100 cm x 15,2 m) :
- Maximum water retention height: 100 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 396 cm
- Packaging: W 69 cm x L 116 cm x H 51 cm
- Weight: 126.8 kg

WL 5030 (100 cm x 9,1 m) :

- Maximum water retention height: 127 cm
- Protection length: 9.1 m
- Width (depth of ground surface): 508 cm
- Packaging: W 66 cm x L 103 cm x H 53 cm
- Weight: 117.5 kg

WL 5050 (100 cm x 15,2 m) :

- Maximum water retention height: 127 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 508 cm
- Packaging: W 84 cm x L 103 cm x H 69 cm
- Weight: 187.7 kg

WL 6030 (152 cm x 9,1 m) :

- Maximum water retention height: 152 cm
- Protection length: 9.1 m
- Width (depth of ground surface): 608 cm
- Packaging: W 66 cm x L 129 cm x H 48 cm
- Weight: 123.8 kg

WL 6050 (152 cm x 15,2 m) :

- Maximum water retention height: 152 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 608 cm
- Packaging: W 86 cm x L 129 cm x H 61 cm
- Weight: 204.8 kg

WL 7850 (198 cm x 15,2 m) :

- Maximum water retention height: 198 cm
- Protection length: 15.2 m
- Width (depth of ground surface): 792 cm
- Packaging: W 109 cm x L 203 cm x H 66 cm
- Weight: 241.8 kg

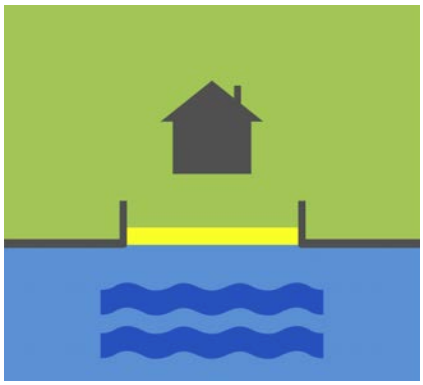
4 PROTECTION LAYOUT OPTIONS

The Water-Gate perimeter protection system allows you to protect an entire building by keeping the flood at a safe distance from the walls, rather than protecting each opening separately.

The principle behind the Water-Gate dam is to keep the water away from the assets that need to be protected.

Various scenarios are possible:

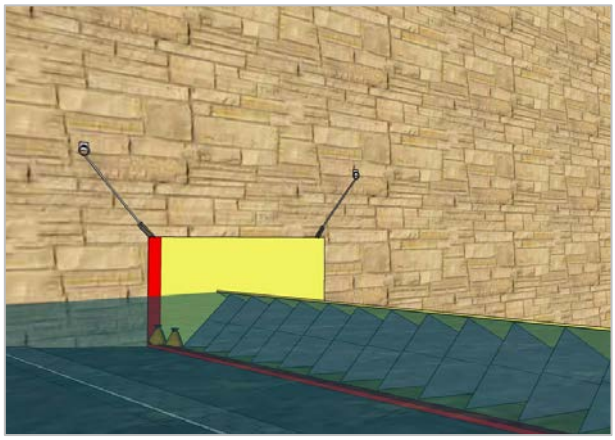
1) Sectional protection – Fitted between two walls
2) Semi-perimeter protection – Supported by facades with angles (e.g. wall lights) or an embankment
3) 360 ° protection – The ends meet



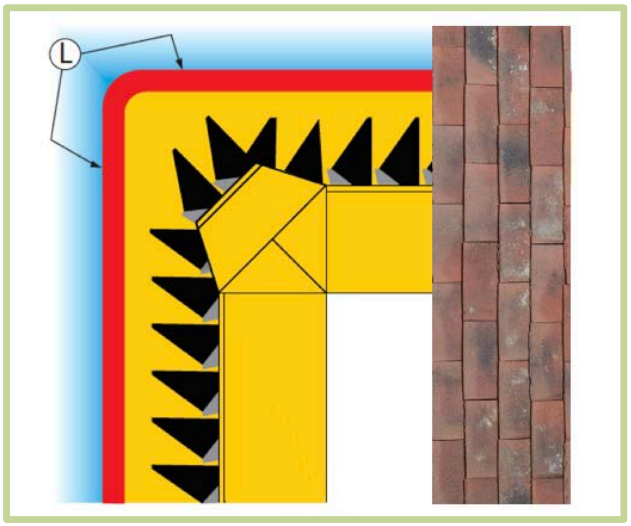
4.1 Fitted between two walls

The dam is unrolled on the ground and the loops at either end are attached to the wall using cords: the fixing rings must be installed the first time the dam is used.

The wall fixings are not "anchor points" in the sense that they are not designed to hold the dam when water is flowing (the dam is self-securing), but simply to ensure that the dam is correctly positioned against the wall before the water arrives, thus guaranteeing that the wall becomes just as watertight as the ground. Sandbags should be placed on the corners to limit leakage.



4.2 Supported by a facade with angles



5 RAPID DEPLOYMENT BOXES

Exclusive to Water-Gate: the dams are supplied in made-to-measure rapid deployment boxes.

- The boxes can be moved using an electric forklift truck or trailer.
- The smaller boxes can also be fitted with wheels.
- Simply pull out the first dam and lay it on the ground, then slide the box along the entire length of the dam.
- The sections are pre-assembled and accordion-folded inside the boxes.

Sample video: https://youtu.be/B0OGRo2MXDU

When stored in the boxes, the dams are protected from bad weather, UV rays, rodents and vandalism.
The colour of the boxes and the information panels can be personalised.
A series of signs on the outside of the box indicates the direction in which the dam should be deployed as well as the corresponding sections.
A copy of the user manual, the assembly instructions and the deployment plan are stored in an airtight box inside the container.

5.1 Wooden boxes

Wooden crate 200 meters' flood protection Height 50cm - Hager Electro

Any size (made to measure) up to:
2.44 m Length - 1.2 m Height - 1.22 m Width

Example of box sizes for 200 metres of protection

Water-Gate protection height	Range	Number of barriers	Overall protection length	Number of boxes	Box dimensions	Total weight
51 cm	WL 2050	14	212,8m	1	2.44m Length 1.20m Height 0.92m Width	903 kg
66 cm	WL 2650	14	212,8m	1	2.44m Length 1.20m Height 1.22m Width	1081 kg
81 cm	WL 3250	2 x 7	212,8m	2	2.44m Length 1.00m Height 1.02m Width	2 x 978 kg

5.2 Galvanised steel rapid deployment boxes

Any size (made to measure) up to:
2.44 m Length – 1.2 m Height – 1.26 m Width

Galvanized steel Crate - Protection 100m long, height 100cm - SNCF RER C

5.3 20 ft. rapid deployment containers

Each container is designed to allow for the safe deployment and repacking of the flood protection.
There is a handling walkway with steps on either side of the container for easy operational access.

Dimensions: 6.06 m Length – 2.59 m Height – 2.44 m Width / Sample capacity for the WL 5050 range

Water-Gate protection height	Range	Number of barriers	Overall protection length per container
127 cm	WL 5050	22	334 m

6 WATER-GATE© ANTI-FLOOD PROTECTION

6.1 Prevent flooding in all circumstances

Water-Gate© is a flexible emergency flood dam that harnesses the power of floodwater or firewater to automatically fill, unfold and stabilise itself.
Water-Gate is sold by MegaSecur.Europe, the exclusive European importer of the Water-Gate dam, manufactured by the firm MegaSecur.International at its factory in Victoriaville, Quebec (Canada).

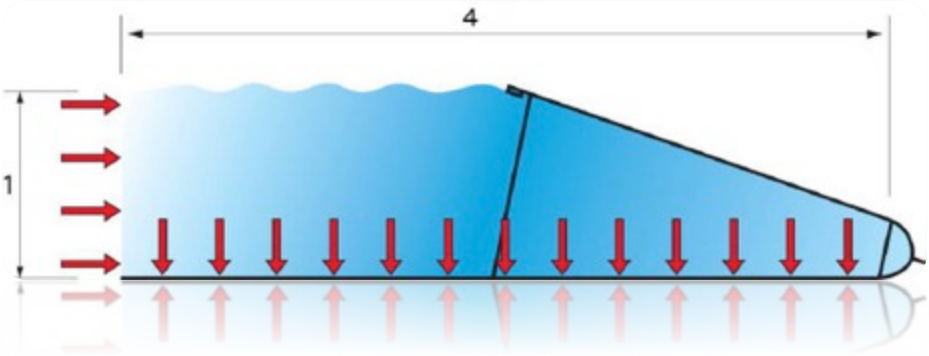
6.2 Introduction to the concept

Water-Gate© is a very effective and safe form of emergency protection:

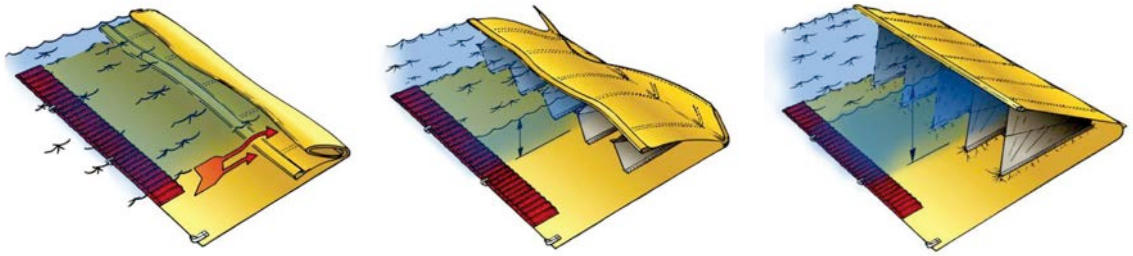
- Water-Gate can instantly replace thousands of sandbags
- Water-Gate remains stable regardless of its length, the direction of the current, and the gradient of the surface

Water-Gate© can retain thousands of cubic metres of water without anchorage!
The design of the Water-Gate mobile anti-flood dam, with a height to ground depth ratio of 1:4 (1:3 for the WS urban range) guarantees perfect stability and grip on any kind of surface, regardless of the height of the protection.

The thrust acting on the ground section is 3 to 4 times greater than the horizontal thrust.



The Water-Gate anti-flood dam deploys automatically once the water begins to flow.

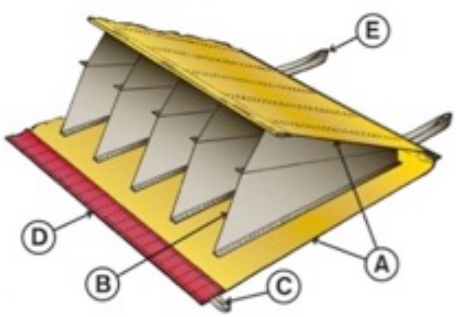


Water-Gate© products have been winning accolades worldwide for their performance for over 15 years.

6.3 General features

Water-Gate© Mobile Anti-Flood Dam

A. Ultra-rugged and abrasion-resistant PVC-coated polyester fabric. Can be installed on all types of surfaces.
B. Stretched partitions for better grip on smooth surfaces.
C. Polyethylene loops to hold the device in place if necessary.
D. Ballast provided by galvanised steel plates embedded in a polyester mesh sewn onto the barrier.
E. Polyethylene loops (to hang up the barrier for drying purposes).



Deployment
The mobile anti-flood dams are supplied in the form of rolls that can be unrolled on the ground. Alternatively, they are packaged in a box specially designed for rapid deployment.

Handling
Water-Gate anti-flood dams are manufactured in unit lengths of up to 15.2 metres, allowing them to be installed by just one or two people (depending on the height of the protection). This modularity also allows for intermittent flood protection that can be adapted to suit the situation.

Modular design
Our flood protection can be extended as needed with no reduction in efficacy.
Water-Gate flood protection can be lengthened by simply adding additional sections, even ones of different heights: they can be quickly connected without tools thanks to the double-Velcro system.
The opposite process is equally simple: components that are no longer useful, e.g. because the flood has died down, can be quickly removed without compromising the efficacy of the remaining flood protection.

Stability
Water-Gate© remains stable regardless of its length, the gradient of the land, and the direction of the current (face-on, from the side or backwards). There is no risk of slippage, so the dam requires no anchorage.

Watertightness
Water-Gate flood protection guarantees superb watertightness thanks to both the pressure exerted by the water on the ground section and the integrated ballast system, which prevents water from seeping under the dam.

- Leak rate on smooth ground (such as concrete): 4 l / min / linear metre
- Leak rate on natural surfaces: 6.5 l / min / linear metre

Flexibility for your chosen perimeter
Water-Gate flood protection can be curved at any point and in any direction in order to suit the situation (e.g. protection around the perimeter of a building). It is possible to create a right angle without any additional components by simply folding the barrier (method described in the user manual).

Adapts to all types of terrain
Mounds, ditches, pavements, stairs, rails ... the ground does not need to be flat. Nevertheless, we recommend that you position ballast bags around significant breach points such as curbs and low walls.

Fits over obstacles
Water-Gate flood protection can pass over obstacles/objects. The pressure of the water on the fabric forces it to cling to the object, thus avoiding leaks.

Adapts to any type of surface
Asphalt, turf, gravel, interlocking paving stones, slabs, tiles ... even sand (with some special precautions).

Shock-resistant
As it is made from flexible materials, the Water-Gate mobile anti-flood dam is particularly resistant to impacts (e.g. drifting objects). The dam easily absorbs the energy of impacts without breaking, tearing or losing stability.

The shock resistance tests carried out using tree trunks travelling at high speed are rather impressive.

See the FM Global certification & test video: https://youtu.be/51ytObyMMVc

In the very unlikely event of a tear developing while the dam is in water, simply slide a piece of canvas inside the dam to seal the breach (the pressure of the water on the canvas makes the seal watertight).

Durability
The Water-Gate flood dam is an extremely strong and robust product. The dam is made of PVC-coated polyester fabric that is highly abrasion and tear-resistant. The secure lock stitching is done with 100% polyester thread. One broken lockstitch does not compromise the following stitch. The materials used to make the barrier can easily withstand temperatures of +50 °C to -40 °C, as well as most chemicals.
Since the Water-Gate flood dam is made exclusively of polymeric materials, it will last approximately 20 years if used 2 to 3 times a year.

Maintenance
Water-Gate© mobile dams require little maintenance. We recommend cleaning and drying the flood dams after each use (hooks are provided to hang up the dam for drying purposes). Dirt and moisture do not affect Water-Gate's quality and durability, but they may result in unpleasant odours the next time the dam is used.

Installation while flooding is ongoing
It is perfectly possible to install the Water-Gate dam while flooding is ongoing, but please note that more people will be required in order to do so.

Example of draining an already-flooded house - Quebec - April 2012



Crossing possible on dry land and in water

The flexible barrier can be crossed in both directions

- On dry land whatever the size of the vehicle
- In water: safely up to mid-axle height, and with appropriate precautions above this height (the chassis should never catch on the top of the barrier)

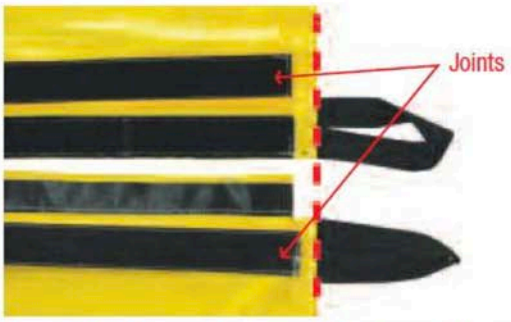
Warranty

Each dam is manufactured and inspected in line with our stringent quality standards. A serial number can be found at either end of each flood barrier to ensure traceability.

Our flexible barriers are guaranteed against design, material and production defects for a period of two years. This applies to the UV resistance, water tightness and mechanical strength of fabrics and technical materials stored in their original container.

6.4 Make the junction between 2 sections

1. The first step consists in completely unrolling and unfolding the two barriers and laying them one next to the other.



2. Both barriers must be aligned at the back. Make sure the joints are open.

3. Open the top fabrics on each side to uncover the bottom joints and insert the barrier on the right into the one on the left.

4. Close up the velvet strips and hooks by laying them one on top of the other from the back. Good dexterity is required to close up the back.

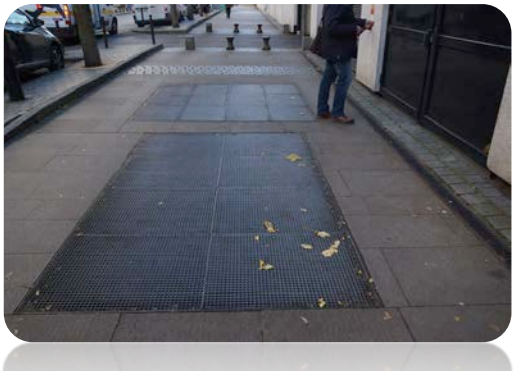
5. Keep closing up the velvet strips and hooks from the back until you end at the front.

6. When you are done with the joint at the bottom, insert the partition of the barrier on the left in the partition of the barrier on the right and close off the top parts.

7. Close up the velvet strips and hooks by laying them one on top of the other, the same as you did for the bottom joint.

6.5 Watertight grating kit for the temporary sealing of gratings and openings

MegaSecur has developed PVC tarpaulins with "sticky" polyurethane edges (very soft – 0 on the Shore scale) 10 mm thick.
This highly adhesive polyurethane ensures a totally watertight seal on dry ground and a good seal on wet ground.



6.6 Disposing of seepage water by pumping

No mobile flood protection system is totally watertight. Even the surface on which the dam rests is not 100% watertight.

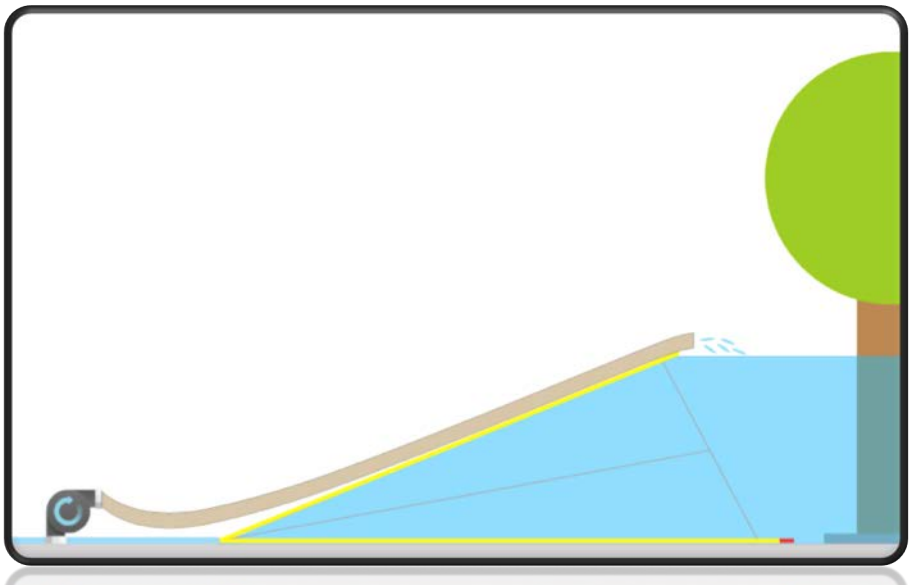
Water-Gate barriers have been certified by FM Approvals for a height of 1 foot.
The leak rate of the FM Global protocol is 3.1 litres/min/linear metre (0.25 gpm) regardless of the height. This is a very strict requirement given the test conditions (shallow depth and powerful waves).
Here are the leak rate results for Water-Gate© barriers | consistent with our general observations.
1.6 l/min/lm for 1 foot (30.5 cm)
3.5 l/min/lm for 2 feet (61 cm)
6.8 l/min/lm for 3 feet (91.5 cm)

FM Approvals®
Member of the FM Global Group

See the excerpt in the annex
FM Approvals – Approval Standard for Flood Abatement Equipment - Extract

We recommend that a pumping solution be put in place to collect water that has seeped through and discharge it beyond the dam.

Due to gravity, seepage water flows towards and gathers at the site's low points. We recommend self-priming motor pumps or submersible pumps coupled with generators.



6.7 Technical specifications of the fabric

Outer layer - PVC fabric			
Property	**Min. specification**		**Certified**
Weight	750 g/m^2		Yes
Base fabric	Woven polyester net		-
Tensile strength	Warp 55 kg/cm	Weft 50 kg/cm	Yes
Tear resistance	Warp 45 kg	Weft 35 kg	Yes
Adhesion	Warp 1.5 kg/cm	Weft 1.5 kg/cm	Yes
Temperature resistance	-30 ° + 70 °C		Yes
UV resistance			No

Inner partitions - Polyethylene fabric			
Property	**Min. specification**		**Certified**
Weight	300 g/m^2		Yes
Base fabric	100% polyethylene		-
Tensile strength	Warp 80 kg/cm	Weft 50 kg/cm	Yes
Tear resistance	Warp 40 kg	Weft 40 kg	Yes
Cold resistance	-40 °C		Yes
UV resistance	Resistance >80% after 2,000 hours of exposure		No

6.8 Repairs

In the very unlikely event of a tear developing while the dam is in water, simply slide a piece of canvas inside the dam (on the side facing upstream) to seal the breach (the pressure of the water on the canvas makes the seal watertight). The barrier can then be permanently repaired out of water using the provided repair kit (Zodiac polyurethane 2-part glue for flexible PVC (750 ml) and 5 m x 2 m strip of PVC fabric).

6.9 Certification

Water-Gate flood protection complies with European requirements.

Water-Gate barriers have successfully passed the testing and certification process conducted by FM Global, the world leader in property damage insurance.

The tests were carried out in collaboration with the US Army Corps of Engineers.
Video excerpt of the tests: https://youtu.be/51ytObyMMVc

Three heights were tested: 100 cm, 127 cm and 152 cm.

Features tested (over 24 hours):

- Watertightness and stability at 30%, 60% and 100% of dam capacity
- Resistance to waves at 60%, 80% and 100% of dam capacity
- Resistance to parallel currents
- Shock resistance (impacts from tree trunks)
- Overflow resistance (120% of dam capacity)

FM APPROVED

Certificate of Compliance

This certificate is issued for the following:

Water Gate Perimeter Flood Barriers
WL-3930, WL-3950, WL-5030, WL-5050, WL-6030, WL-6050

Prepared for:
MegaSecur Inc.
145 Boulevard Jutras Est, Bureau 3
Quebec G6P 4L8
Canada

Manufactured at:
MegaSecur Inc.
145 Boulevard Jutras Est, Bureau 3
Quebec G6P 4L8
Canada

FM Approvals Class: 2510

Approval Identification: 3051603 Approval Granted: September 3, 2015

To verify the availability of the Approved product, please refer to www.approvalguide.com

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.

David B. Fuller
AVP, Group Manager – Fire Protection
FM Approvals
1151 Boston-Providence Turnpike
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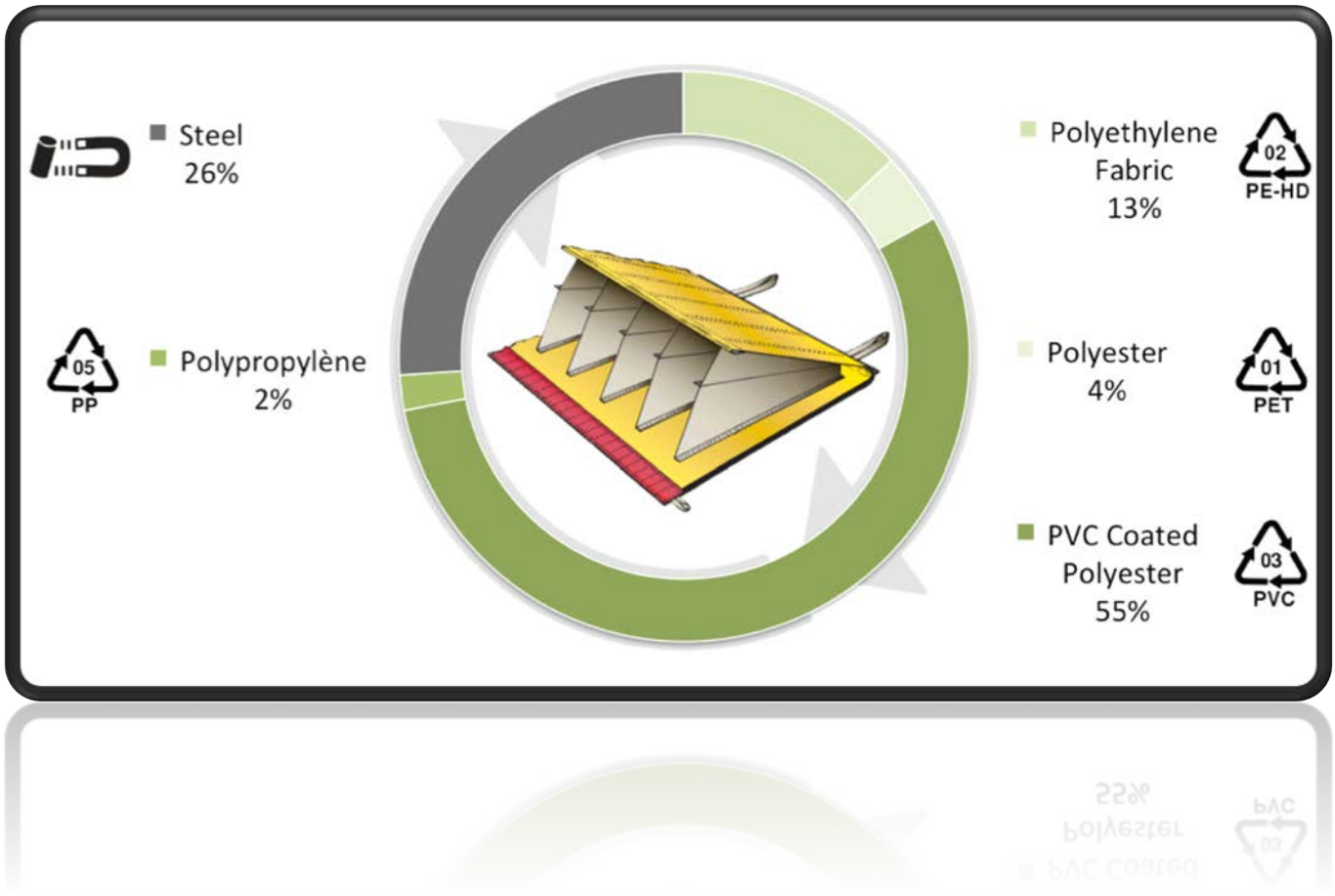
FM Approvals
Member of the FM Global Group

6.10 100% Recyclable

Water-Gate products are made from recyclable materials.

Ground Sheet & Retention Tarp	PVC Coated polyester
Holding partitions	Polyethylene Fabric
Ballast	Steel plates
The sewing thread & velvet strips (Velcro©)	Polyester
Straps	Polypropylene



Picture 7 - Water-Gate WL 2050 Product composition

Our manufacturing process minimises waste production: all PE and PVC raw materials are reused in our low-lying barrier models.
Unused PE is collected by a local company and recycled along with glass to produce composite paving stones for roads.

6.11 References

France

Airports, Transport networks
SNCF Paris Protection of RER C | EUROVIA

Army, Civil Protection, Fire and rescue services
Cuers Pierrefeu Naval Air Station | 25 SDIS

Civil Engineering, Nuclear Energy, Energy Transport, Environment
SPAC | Vinci construction | HydroAlsace

Industrial Environment, Logistics, Banking
Hager Electro Bischwiller | Géant Casino Aix en Provence | BURGEAP | Nestlé Nutrition | Natixis Paris

Cities, Towns
City of Bretteville l'Orgueilleuse 14740 | Town of Petite-Rosselle 57540 | City of Rohr 67270 | City of Simandres 69360 | City of Valencia 26000

Europe

Airports, Transport networks
Copenhagen Airport I CPH

Army, Civil Protection, Fire and rescue services
Eppingen Fire Brigade - Germany | Gernsbach Fire Brigade - Germany | Furtwangen Fire Brigade – Germany

Civil Engineering, Nuclear Energy, Energy Transport, Environment
Sellafield Nuclear Power Plant - UK | Environment Agency of Nottinghamshire

Water Management and Treatment
Thames Water – UK | South East Water – UK | YorkshireWater – UK |Welsh Water - UK

ERP - Universities
Southampton Solent University – UK

Cities, Towns, Parishes
Bergen - Norway | Chaudfontaine - Belgium | Frutigen - Switzerland | Greve Strand - Denmark | Milan - Italy | Mons - Belgium | Neufchatel - Switzerland | Tubize - Belgium | Aosta Valley - Italy

World

Worldwide Airports, Transport networks
Tokyo International Airport – Japan

Civil Engineering, Nuclear Energy, Energy Transport, Environment
National Grid, Natural Gas & Electricity, Syracuze, New York – USA | Exon Mobil

ERP - Universities
Good Samaritan Hospital, New York, New York – USA | Battery Park City Parks Conservancy, New York, New York – USA

Cities, Towns
Bangkok - Thailand | Mexico City - Mexico | Montreal - Canada | Sydney - Australia | Tokyo - Japan

7 ATTACHMENTS

7.1 FM Approvals – Approval Standard for Flood Abatement Equipment - Extract

Water-Gate Perimeter Flood Barriers have been tested within the FM Approvals Class 2510

FM APPROVED

Certificate of Compliance

This certificate is issued for the following:

Water Gate Perimeter Flood Barriers
WL-3930, WL-3950, WL-5030, WL-5050, WL-6030, WL-6050

Prepared for:

MegaSecur Inc.
145 Boulevard Jutras Est, Bureau 3
Quebec G6P 4L8
Canada

Manufactured at:

MegaSecur Inc.
145 Boulevard Jutras Est, Bureau 3
Quebec G6P 4L8
Canada

FM Approvals Class: 2510

Approval Identification: 3051603 Approval Granted: September 3, 2015

2510 **March 2013**

Table 4.2 *Perimeter Flood Barrier Performance Tests*

Test Description	Water Condition(s)		Duration
	Water Depth*	Other	
Deployment	N/A	N/A	Per Manufacturer's Specification
Hydrostatic Load	1.0 ft (0.30 m)	N/A	22 hr
	2.0 ft (0.61 m)	N/A	22 hr
	100 percent x h	N/A	22 hr
Wave-Induced Hydrodynamic Load	66.7 percent x h	low waves 2-3 in (51-76 mm)	7 hr
	66.7 percent x h	medium waves 6-8 in (152-203 mm)	10 min (3 times)
	66.7 percent x h	high waves 10-12 in (254-305 mm)	10 min
	80 percent x h	low waves 2-3 in (51-76 mm)	1 hr (min) - 7 hr (max)
	80 percent x h	medium waves 6-8 in (152-203 mm)	10 min (3 times)
	80 percent x h	high waves 10-12 in (254-305 mm)	10 min
Overtopping	≥1 in (25 mm) overflow	N/A	1 hr
Debris Impact	66.7 percent x h	12 in (30 cm) diameter log 610 lb (277 kg) weight at 7 ft/s (2.13 m/s)	N/A
	66.7 percent x h	17 in (43 cm) diameter log 790 lb (358 kg) weight 7 ft/s (2.13 m/s)	N/A
Current	66.7 percent x h	7 ft/s (2.13 m/s) current	1 hr
Post Hydrostatic Load	100 percent x h	N/A	1 hr (min) - 22 hr (max)

* The manufacturer's specified maximum water depth for the barrier is defined as "*h*".

4.2.2 Hydrostatic Load

4.2.2.1 Requirements

A perimeter barrier shall be capable of withstanding the hydrostatic loads created by floodwaters of various heights. The leakage rate shall not exceed 0.25 gallons per minute per foot length (3.10 liters per minute per meter length), where the barrier's length is measured along the center point of the barrier's seal to the ground.

In addition, the permanent deflection of the barrier shall be less than or equal to 6 in. (15 cm), as measured from the horizontal and vertical center of each wall.

4.2.2.2 Tests/Verification

Conduct three different hydrostatic load tests at the following water heights;

- 1 ft ± 0.5 in (0.30 m ± 13 mm)
- 2 ft ± 0.5 in (0.61 m ± 13 mm)
- 100 percent x h ± 0.5 in (13 mm)

Where h is the manufacturer's specified maximum water depth of the barrier. If this water depth is less than or equal to 2.0 ft, the water depths may be changed as deemed appropriate by FM Approvals.

Fill the river-side of the basin to the desired water level at a maximum rate of 2/3 ft (10.0 cm) per hour. The desired water level shall be held for a minimum of 22 hours for each test.

The leakage rate shall be calculated in intervals no greater than 15 minutes at the following times (at a minimum);

- During the filling process
- During the first hour
- During the last two hours

Measure the barrier's deflection from the horizontal and vertical center of each wall (three locations) at the completion of each test. Additional locations (up to 6 total) shall be required if deemed appropriate for the design of the barrier.

The Hydrostatic Load Test at 100 percent x h water depth shall be repeated after the Current Test, as a post test to the Overtopping, Debris Impact, and Current Tests. The test duration for the post test shall be 1 hour, at a minimum. If negative effects (i.e. increased leakage rates or deflection measurements) are observed during the first hour of the post test, then the post test shall be conducted for a maximum of 22 hours.

4.2.3 Wave-Induced Hydrodynamic Load

4.2.3.1 Requirements

A perimeter barrier shall be capable of withstanding wave-induced hydrodynamic load conditions from various water depths and wave heights. The permanent deflection of the barrier shall be less than or equal to 6 in. (15 cm), as measured from the horizontal and vertical center of each wall.

In addition, during low wave conditions, the leakage rate shall not exceed 0.25 gallons per minute per foot length (3.10 liters per minute per meter length), where the barrier's length is measured along the center point of the barrier's seal to the ground.

There is no leakage rate requirement for medium and high wave conditions. However, during these wave conditions the barrier shall not fatigue, experience fill-loss, wall sliding, overturning, or deformation.

4.2.3.2 Tests/Verification

Six tests shall be conducted; consisting of three different size wave heights (low, medium, and high) at each of the following two still water depths:

- 66.7 percent x h
- 80 percent x h

Where h is the manufacturer's specified maximum water depth of the barrier. If this water depth is less than or equal to 2.0 ft, the water depths may be changed as deemed appropriate by FM Approvals.

Drain the river-side of the basin to the desired water level, or fill the river-side of the basin at a maximum rate of 2/3 ft (10.0 cm) per hour, as applicable.

Impact the barrier with waves generated perpendicular to the face of the barrier as detailed in Table 4.2.3.2. At the end of each test condition, allow the waves to dissipate before starting the next test.

Table 4.2.3.2 Wave Spectrums

Wave Description	*Wave Height (Measured from trough to crest)*	*Mean Wave Period*	*Test Duration*
Low Waves	2-3 in (51-76 mm)	2 seconds	7 hr*
Medium Waves	6-8 in (152-203 mm)	2 seconds	10 min (3 times)
High Waves	10-12 in (254-305 mm)	2 seconds	10 min

* For a water depth of 80 percent x h, if no negative effects are observed during the first hour of testing (i.e. increased leakage rates or deflection measurements), the test duration may be reduced to 1 hour.

Measure the leakage rate for the duration of each low wave test at intervals no greater than 15 minutes.

Measure the barrier's deflection at the completion of each test from the horizontal and vertical center of each wall (three locations). Additional locations (up to 6 total) shall be required if deemed appropriate for the design of the barrier.

7.2 Installation videos / YouTube channel

Find all our videos on our website: https://www.megasecureurope.com/videos/