AGGERES
Flood solutions.

USER GUIDE

VELOX EMERGENCY WATER BARRIER

AGGERES NV

CONTENTS

1. GENERAL INSTRUCTIONS

1.1 RESPONSIBILITY

Before using your Velox water barrier, it is essential to read the entire user guide and conduct at least one preliminary test. This is meant to ensure you master all the steps required for installing the water barrier. The vendor and manufacturer shall in no way be responsible for faulty installation and/or faulty use of the water barrier.

1.2 MANUFACTURING OF THE VELOX

The manufacturing of the Velox water barrier is done with industrial sewing machines. The type of stitch used is called “lockstitch”. This type of stitch does not break even if the main stitch has been severed. A broken stitch does not affect the following stitches. On top of using this secure stitching, we also provide a second parallel stitch on all partitions of the barrier.

1.3 DURABILITY

Considering that the water barrier is entirely made of polymer, the estimated longevity of the product can be over 20 years if the product is used occasionally and/or for short periods. Ultraviolet rays remain the most harmful factor for the components of the water barrier. However, the polymer canvas has been treated to counter the harmful effects of ultraviolet rays.

Since the barrier is entirely made of polymer, there are no risks of damage by humidity. The barrier’s materials resist temperatures of +50°C/+120°F to -40°C/-40°F. Even when stored for several years at these temperatures (maximum 10 years), the Velox remains as effective.

1.4 MAINTENANCE

It is strongly recommended to wash and dry the Velox water barrier before storing it. This allows you to check for any damages that may have occurred during use. Cleaning the product with a pressure washer is strongly recommended. Dirt and trapped in humidity do not affect the quality or the resistance of the barrier, but could lead to unpleasant odours when the barrier is used again.

To clean the barrier, hang it by the rear since it is equipped with at least one rear strap every 1,5 m. A fence or rack are excellent places to wash and dry the barrier. You simply have to install hooks on the top of your fence or on the edge of the rack. One hook will be required for each rear strap.

If you plan on making continuous intensive use of the barrier, you will need to have the right equipment for proper maintenance.

1.5 STORAGE

The barriers can be piled one on top of the other, upright or flat, without this hampering their deployment. However, storing the barrier in a vertical position is highly recommended to maintain its shape when rolled up. We don't recommend setting the barrier directly on a damp surface. It is best to lay it on a wooden pallet.

If there is water trapped inside the barrier during storage, this will not affect product longevity as long as the water is dirt free. Fallen leaves and other waste material left inside the barrier can damage and dry up the fabric, thus reducing the useful life of the barrier. When the barrier is properly washed and stored, it does not emit any odours. However, improper cleaning and storage may lead to some unpleasant odours when the barrier is deployed once again.

Every barrier should be kept in its storage bag or crate for protection against UV rays, dirt, and damages, as well as easier handling during transport. As far as rodents are concerned, they are not attracted to polymer canvas and will not chew this type of material.

"Blanket" type bag used for heavy barriers that may require handling by more than one person.

1.5.1 FOLDING THE BARRIER

It is very important to fold the fabric correctly before the water barrier is stored. Improper folding may jeopardize the installation of the barrier when it is reused.

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2. With the help of a stick, make sure that all the partitions of the barrier are smoothed out.

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4. Start folding a first section of the barrier at the back. Use the folds already appearing on the fabric as a reference.

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ack. Folding

second fold is often necessary. You have finished folding the back of the barrier when you reach the barrier float.

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8. Roll up the barrier making sure the label on the outside of the barrier is visible from the outside.

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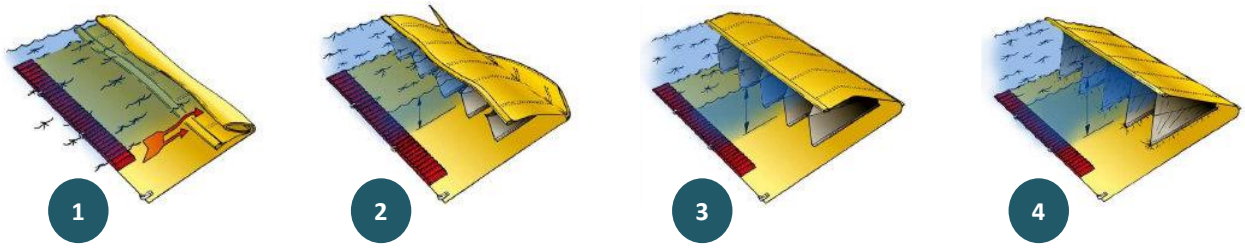
2. WORKING PRINCIPLE OF THE VELOX BARRIER

The principle is quite simple:

1. Incoming floodwater unfolds the barrier.
2. Water collects inside the barrier and exerts pressure on the bottom which keeps the barrier in position.

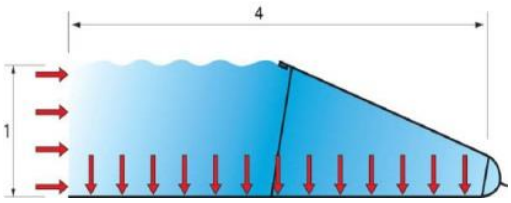


The Velox barrier is designed for use on waterways and to divert floods. The barrier has detachable weights (velcro). When used in waterways it is advised to take off the weights.

2.1 WATER HOLDING BACK WATER

The surface of the barrier on the ground is 4 times greater than its water retention height, which means it has 4 times more vertical thrust (toward the ground) than horizontal thrust, allowing for good adherence.

In order for water to be able to hold back water on most surfaces such as asphalt or grass, a ratio of 1 to 2½ is generally sufficient to ensure safety. With a ratio of 1 to 4, the Velox barrier is obviously very safe and the chances of it slipping are very slim. The wider the barrier is, the less likely it is to slip. To conclude, the Velox water barrier is 33% safer than required.

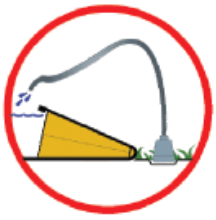


3. INSTRUCTIONS FOR INSTALLATION

3.1 FOUR IMPORTANT RULES

1. Pump the water at the back of the barrier

It's important to leave a reasonable amount of space between the building and the back of the barrier in order to install a water pump and be able to move freely. The water seeping underneath the barrier should not be left to accumulate behind the barrier. This is why the area should be kept dry using one or more water pumps.



2. Place an even amount of weight at the front

Do not tie the barrier to the ground, as it uses the weight of the water to stop oncoming water. However, it is very important to place even weights along the entire length of the front flap to minimize water infiltrations underneath the barrier and keep it on the ground.

3. Prevent water from accumulating under the barrier

Remove all objects likely to create water infiltrations under the barrier flap. The barrier is designed to stay in place on all surfaces such as asphalt, gravel, lawns, and concrete paving blocks, but if there is too much water under the flap, the barrier will not adhere as well and may slip. It is thus important to make sure that the ground is free of objects that could cause water to accumulate under the barrier.

4. Never try to contain a leak at the back of the barrier

If there are leaks, stop the water from coming in at the front of the barrier. In most cases, such problems are caused by water infiltrations at the front. Trying to contain a leak at the back of the barrier will create a pool of water and make the barrier unstable.

3.2 TYING TOGHETHER TWO BARRIERS

To tie together two Velox water barriers, **BOTH BARRIERS MUST BE COMPLETELY UNFOLDED AT THE ATTACHMENT JOINTS.**

All our barriers, regardless of size, can be tied together, except for the smallest 15 cm model, which can only be tied to barriers of the same size.

To tie together two water barriers, a straight surface is required, especially under the joint where the two barriers will be attached. Do not tie barriers together in moving water. If the temperature is below freezing, the water in the velcro strips and hooks may freeze, making it impossible to tie the barriers together.

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

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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.

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e same as you

Use the same method to tie together **two barriers of different sizes**. Make sure the two barriers are aligned at the back.

4. USE OF THE VELOX BARRIER TO CONTROL FLOODS

To use the Velox as an anti-flooding barrier you need to place counterweights on the ballast zone. These weights need to be sufficiently heavy in order not to be carried away by the current. The Velox barrier has detachable weight strips that are attached with velcro.

4.1 INSTALLATION OF THE BARRIER ON A SMOOTH SURFACE

The water pressure exerted on the fabric at the bottom of the water barrier is 4 times that of the pressure exerted on the side (see **"WATER HOLDING BACK WATER")**, which is amply sufficient to hold down the barrier on most surfaces found outdoors (asphalt, lawn, gravel, concrete paving blocks, etc.). However, some exceptionally smooth surfaces, such as tarred asphalt or polished cement, require particular attention. What happens with this type of surface is that the water stays trapped between the fabric underneath the bottom of the barrier and the smooth surface. This can cause the barrier to start sliding on the water trapped below it.

It is very important to understand what it takes to ensure that the barrier adheres properly to the ground: **AT NO TIME SHOULD WATER ACCUMULATE UNDERNEATH THE BARRIER.** When deployed on regular asphalt, the barrier is very safe due to the presence of small cracks in the asphalt that enable the water to drain through to the back of the barrier.

If the barrier has to be installed on an **EXTREMELY SMOOTH** surface, you need not worry about its stability. All you have to do is simply take some additional precautions. Here are a few solutions:

Place extra weights on the ballast zone in order to avoid water infiltration.

2) Place stakes at the back of the barrier at a reasonable distance (1 to 3 meters) or even have the sides of automobiles rest against the back of the barrier. This technique ensures that the barrier will not slip. Should the barrier begin to slip, it would gently be stopped by the stakes, posts or automobiles and would hold back the flood without damaging anything.

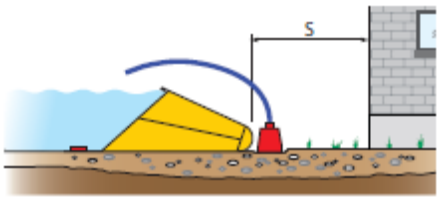
4.2 DETERMINING THE HEIGTH & LENGTH OF THE BARRIER

Straight lines are easy to determine, but we recommend adding 1% to 3% of extra barrier length. This margin is necessary due to the imperfections of the surface and because the material may have undergone a small amount of shrinkage during manufacturing.

To go around a building, the calculations are somewhat more complex. In this case it is advisable to follow the instruction below:

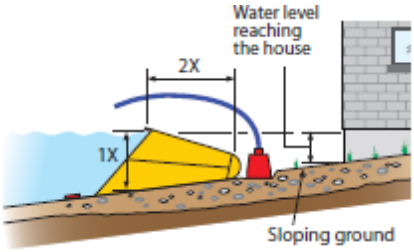
1. Keep an adequate amount of space between the protective barrier and the building:

No matter where you decide to set up your protective dam, you need to have an adequate amount of space (S) to be able to move around and place pumps of appropriate capacity to remove all the water at the back of the barrier. The barrier should never rest against the wall of the building. To maximize protection, set up the barrier as far as possible from the location you want to protect.



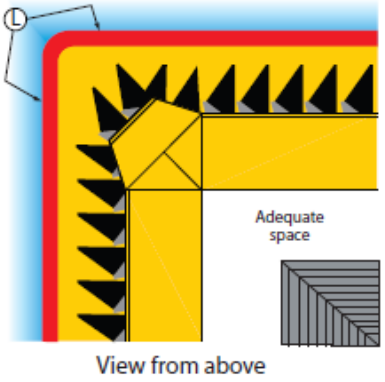
2. Determine the water level of the flood:

It is important to choose barriers that are not smaller than required for the expected water level. Be careful on sloping ground, as the water level reaching the house will certainly be lower than the water level where your barrier will be installed. As soon as you have chosen the barrier with the right water retention capacity, calculate 2 times its water retention to determine where to place the back of the water barrier.



3. Determine the length of the barriers:

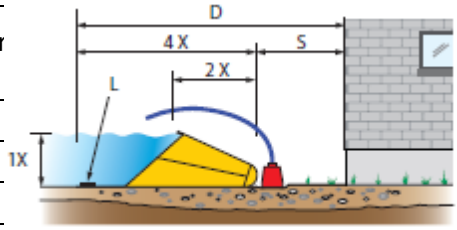
To determine the required lengths, you must absolutely measure the distance to the outermost point Ⓓ on the barrier and also consider the relief of the ground. You must also add 1% to 3% in length to cover the imperfections on the ground. In the opposite illustration, the red line Ⓛ (or ballast weights) determines the length of the required barrier(s).



View from above

Reference table

Height barr **1 X**
35 cm
50 cm
67 cm
1 m



Side view

S = Adequate space at back of the barrier
1 X = Height of the barrier (maximum water retention)
2 X = 2 x height of the barrier
4 X = 4 x height of the barrier
D = Calculation distance for barrier length
L = Required barrier length

4.3 MAKING A CORNER OR CURVING THE BARRIER

To make a corner or curve the barrier, the entire corner or curved section **MUST BE COMPLETELY UNFOLDED.**

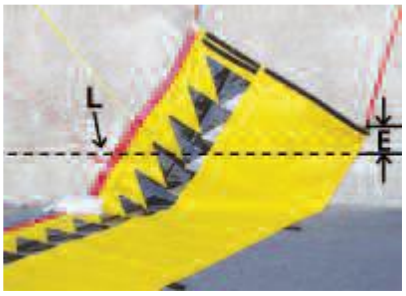
As explained previously, the furthest edge of the barrier must always be taken into consideration to determine the length of the required barriers. The green dotted line on the photograph shows the required barrier length. The barrier can be curved to any given angle, however, we recommend curving it in such a way as to repel the water. If you use the opposite method, making corners to contain the water, chances are that a lot of water will seep through under these corners and too much water seeping through can cause the water barrier to slip. This is why we do not recommend curving the barrier to contain water, even if this method can work very well.

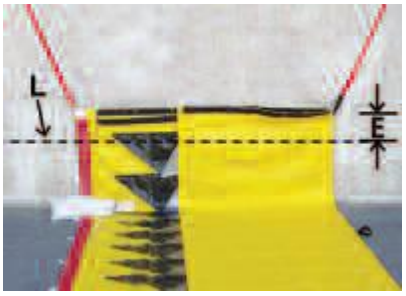
Method used to contain water (Not recommended)

The barrier is better adapted to and safer for repelling water, as the ballast weights at the front remain evenly seated against the ground and do not fold over, keeping water leaks under the barrier down to a minimum.

4.4 PLACING THE ENDS OF THE BARRIER

The ends of the water barriers are not closed off, as they must rise up higher than the level of the flood. Since the water flows freely inside the water barrier, the front and/or back sides of the barrier must be higher than the maximum flood water level. The 3 photographs below show that it is important for the barrier to be sufficiently longer than the wall or ledge so that no water will flow out from the ends. Extra barrier length will also provide maximum safety.





L = Flood water level or maximum water barrier opening.
E = Extra barrier length. We recommend a minimum extra length of up to 50%, depending on the flood water level.

In addition, every time the barrier is abruptly lifted against a wall, a space is created and water will infiltrate through the corner. We strongly recommend placing one or more sandbags in the corners. This will prevent water infiltrating through those corners.

4.5 PROTECTING AN ENTRANCE

The water barrier is not designed to be installed in a door frame. For adequate protection, you must go around the door and lift up the ends of the barrier on each side of the wall. This type of protection requires extensive barrier length based on a calculation of the exterior barrier contour.

Using Velox water barriers in front of the door will give you better protection, as you will be able to pump out any water infiltrations before they reach the door. You will also maintain access to the exits of your building at all times.

If you decide to only protect the entrances instead of all the walls of your building, make sure that no water can seep in through the walls.

4.6 INSTALLATION ON A MANHOLE

Under no circumstances should you install your water barrier on a manhole, unless you are absolutely sure that it will not overflow during the flood. If your water barrier has to be set up in a location where there is a manhole, you must absolutely find a way around the manhole and choose another path. The simplest solution is to install the barrier behind the manhole. You can also set it up in front. If you choose this second solution, you will have to close up the manhole. We also have a product designed for manhole backup. For more information, see our section entitled **"INSTRUCTIONS IN CASE OF MANHOLE BACKUP".**

4.7 NEVER INSTALL THE BARRIER AGAINST A WALL

If you set the back of the water barrier against a wall, water will slowly accumulate between the wall and the barrier. The water gathered at the back of the barrier will then seep into your building. This will also have the effect of destabilizing the barrier.

4.8 IMPORTANCE OF HAVING WATER PUMPS

No matter what type of protective dam you use, a certain amount of water will almost always flow into the protected area. Water pumps are as important as your protective barrier. Make sure that if a flood occurs you will be able to use your pumps and they will be in good operating condition. We strongly recommend having a generator to power all your water pumps or having gas operated pumps. Without these water pumps, the accumulated water leaks will invade your protected area and your protective dam will be useless. These leaks can be due to a number of different factors:

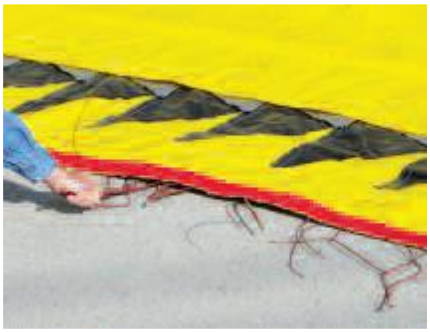
- ✓ Wet ground that becomes permeable
- ✓ Small cracks under or through the dam
- ✓ Sewage pipes
- ✓ Unbalanced water pressure due to the flood

When you install one or more water pumps, it is important to leave enough space between the building and the back of the barrier to allow you to move freely and regularly check the pumps. Make sure your pumps have enough power to pump up all the water flowing under the barrier and prevent this water from reaching the wall of the building.

4.9 PREVENTING WATER INFILTRATION UNDERNEATH THE BARRIER

The secret of a safe water barrier installation starts by reducing water infiltrations under the barrier to a minimum. To do this, it is important to remove any objects underneath the barrier in order to evenly place ballast weights on top. Also remember that the barrier could suddenly lift up, which would cause significant infiltrations at the corners. For this reason, we recommend putting sandbags on the corners to prevent them from lifting up.

Be careful: When the flood water enters the barrier, the fabric could retract and create new spaces allowing the water to flow under the barrier. You must always keep an eye out to make sure this doesn't happen.



4.10 BARRIER REACTION TO THE WIND

The water barrier can be installed fairly easily, even in high wind. The wind's strength isn't on the ground. Everything higher up that gets taken away by the wind ends up on the ground and eventually comes to a standstill. Since the water barrier gets unrolled on the ground, it is less exposed to the wind than objects further up!

The barrier can easily be kept on the ground in very strong wind, however, some additional precautions do have to be taken. Although the wind is less strong on the ground, a vacuum can be created on top of the barrier and cause it to lift up.

If possible, to minimize the effect of gusting wind, keep the barrier folded and add a sufficient number of ballast weights to keep it tight against the ground. When the flood water arrives, the barrier can be unfolded and will automatically deploy based on the position of the ballast weights. To ensure the barrier is properly deployed, push off any ballast weights that are in the way.

Increase the number of sandbags if the wind gets too high. Their weight as well as the pressure of the wind blowing on the surface of the fabric and against these sandbags will reduce the vacuum effect.

4.11 DO NOT TY THE BARRIER TO THE GROUND

We do not recommend tying the water barrier to the ground for 2 reasons:

1) The barrier tends to contract as it fills up with water. Tying down the barrier will put tension on the front flap, which will create spaces for the water to flow through since the fabric cannot remain tightly against the ground.

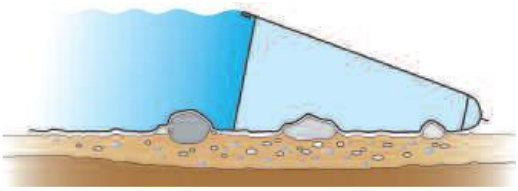
2) Tying the barrier to the ground can complicate things if a new configuration is required.

5. USE OF THE VELOX BARRIER IN WATERWAYS

5.1 ADHESION OF THE BARRIER IN WATERWAYS – 2 PRINCIPLES

5.1.1 PRINCIPLE 1

The pressure of the water on the bottom fabric of the barrier makes the barrier stick closely to the uneven bottom of the stream. The more the bottom of the stream is uneven, the more the barrier adheres to the bottom. The water barrier will adhere very well in the great majority of streams and rivers.

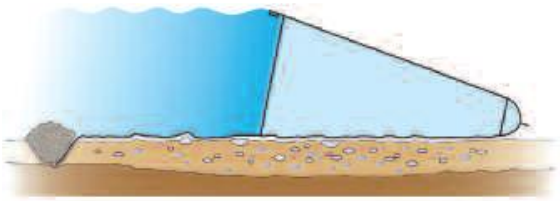


However, the bottom of some streams may cause problems if they mainly consist of sand or hard and smooth clay. Here are 3 types of bottoms that you are likely to come across:

A. Bottom of a normal stream composed of gravel: ± 95%
B. Bottom of a stream only covered with sand: ± 3%
C. Bottom of a stream composed of clay: ± 2%

A. Bottom of a normal stream composed of gravel:
This type of bottom is found in the great majority of streams and rivers (± 95% based on our estimate). It consists of small gravel and/or big rocks. The barrier responds very well in this case. However, if the gravel is very thick, water infiltrations are likely to occur. To keep water from flowing under the barrier, make a trench across the stream and bury the front flap of the barrier.

B. Bottom of a stream only covered with sand:
This type of ground is rarely found in streams (± 3% based on our estimate). The barrier adheres well to a sandy bottom, but you have to make sure that there are no water infiltrations under the barrier during installation. If this occurs, what may start out as a small leak can become difficult to control and especially to stop. After some time, the leak can become so big that the barrier will sink into the hole made by the water and end up slipping. This phenomenon is called “piping”. Setting up the barrier in this type of stream is not recommended.



Front flap buried in the bottom of the stream

However, if it has to be done, the following precautions should be taken:

1) Bury the front of the barrier flap in the sand at a depth of more than 15 cm.

2) Place sandbags along the entire length of the front flap of the barrier.
3) Insert a plastic tarp under the joints if 2 barriers have to be tied together in order to prevent infiltrations that could lead to piping.

C. Bottom of a stream composed of clay:
Certain streams are completely covered with clay (± 2% based on our estimate). The clay can be either solid and very slippery or unsteady and viscous. This type of bottom is rather rare, but when encountered, caution should be taken by better insulating the front of the barrier. The Velox water barrier adheres to this type of ground. However, as soon as the water level reaches the full capacity of the barrier, the danger of slipping is increased because of the slippery surface.

The following precautions should be taken in these conditions:

1) Place stakes behind the barrier so that it can lean against these stakes if it starts to slip.
2) Put ballast weights along the full length of the front flap to prevent water infiltrations under the barrier or bury the front flap.

5.1.2 PRINCIPLE 2

Adhesion of the water barrier in a stream also depends on the following factors:

A. Overflow of water over the barrier
B. Surplus of water at the back of the barrier
C. Overflow of water over the barrier with a surplus of water behind it

The examples below are based on an installation in a stream with a bottom covered with medium size rocks and gravel. The result can be very different if the surface on which the barrier rests is more uneven or smoother.

A. Overflow of water over the barrier:
The situation shown in Figure 1 is not likely to occur because there is no accumulation of water behind the barrier. In this case, the barrier can hold a surplus of water of up to about 33% on top. This approximate percentage represents the point at which the barrier
will slip.

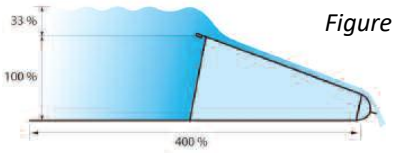


Figure 1

B. Surplus of water at the back of the barrier:
The situation shown in Figure 2 is the opposite of that in the previous figure. The risk of slipping is the same as in Figure 1, as the maximum acceptable amount of water behind the barrier is also ± 33%.

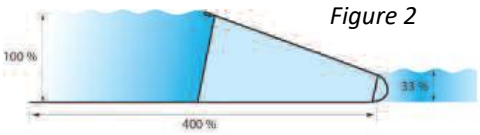


Figure 2

C. Overflow of water over the barrier with a surplus of water behind it:
The situation shown in Figure 3 occurs regularly. The water over the barrier added to the water behind it adds up 33%. Based on the slope and the flow of the stream, the surplus upstream can vary but the total amount of excess water cannot exceed 33%.

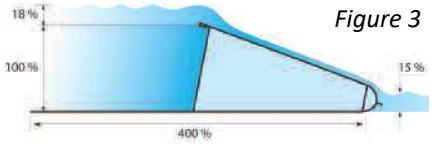


Figure 3

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