

# User instructions

## NOAQ Boxwall BW102

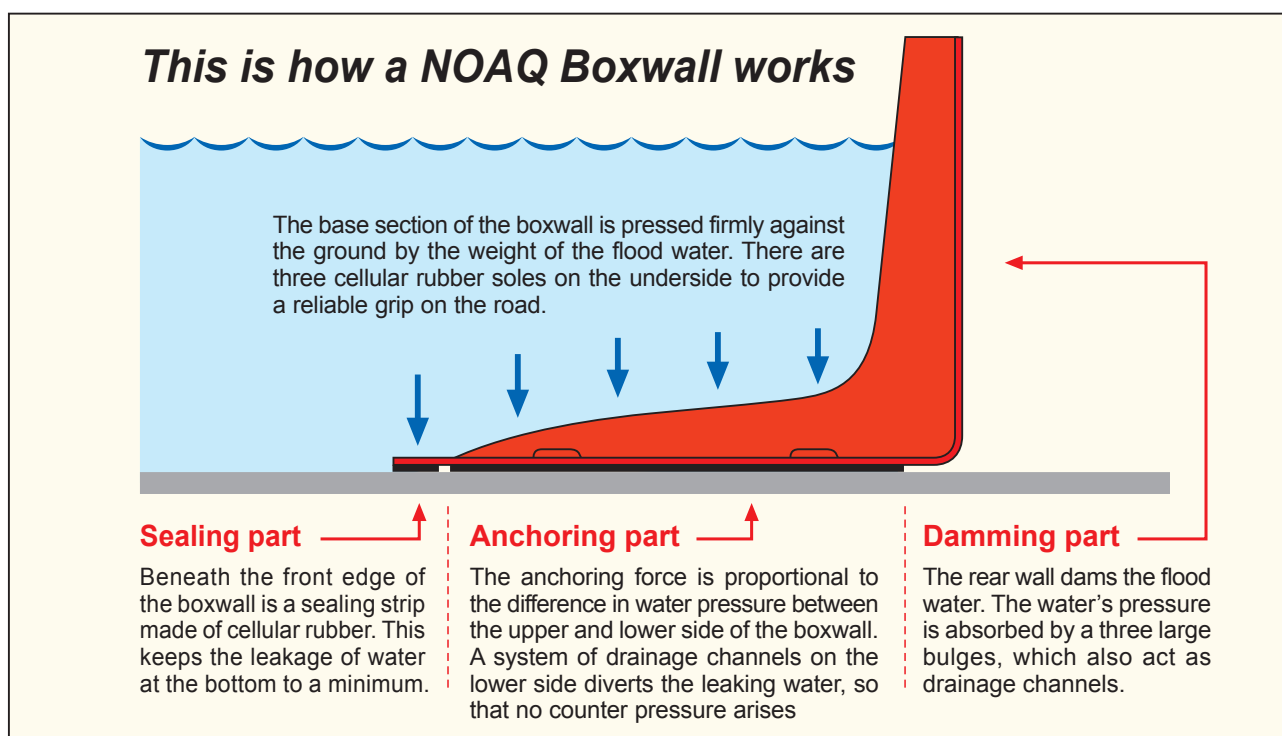
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A NOAQ Boxwall is a mobile self-anchoring flood barrier. The NOAQ Boxwall BW102 creates a dam for water up to a height of 100 cm. The boxwall is so light that it can quickly be set up to protect buildings and other property against water damage, and also to keep roads open. A boxwall is designed for use on an even surface, such as a paved street, a concrete floor or a lawn.

A boxwall consists of sections (boxes) that are linked together by means of a simple manual operation. No tools are needed.

The NOAQ Boxwall is also available in a lower model, called BW52, with a damming ability of 50 cm.



Each box consists of a damming part (the rear wall), an anchoring part (the horizontal section that rests on the ground) and a sealing part (the front edge of the horizontal section). Sealing strips of cellular plastic are fitted under the front and side edges. Each box is also fitted with three cellular rubber soles to create a good grip on the road.

A boxwall is built up by snapping boxes one at a time onto the previous one. The easiest way is to work from left to right (viewed from the dry side). You should avoid working from two directions, as it is difficult to make the two wall sections meet at exactly the same point.

As with all mobile flood barriers you need to count on a certain leakage. This can be minimized by covering the barrier with a plastic liner. But water is also leaking through the ground under the barrier. Water may also come to the protected area as rain and through brooks which have been cut off by the barrier itself. **Therefore one or more pumps must always be put on the intended dry side of the barrier.**



NOAQ Boxwall BW102 together with the BW52

## Follow these instructions:

### 1. Inspect the area where the boxwall is to be constructed

The boxwall has been specially designed for firm, even surfaces such as asphalt, concrete, lawns etc. It is therefore ideal for setting up on streets and paths, across car parks, in industrial areas, around shopping malls, in harbours and at airports. It must not be used on surfaces that are very uneven or on ground that is prone to erosion. Inclinations of the ground of up to 1:10 is no problem, but abrupt transitions from a surface with one inclination to another need to be done perpendicularly. Holes or bumps should be avoided. The boxes are 992 mm long but overlap one another, which means each box adds 900 mm to the total barrier length. A boxwall requires a free width of 1,200 mm.

Loose sand and gravel must be brushed away from where the wall is to be erected. The soles attached beneath each box have just as good a grip as the rubber soles on your shoes. If there is sand on the road you run the risk of slipping, and the same applies for the boxwall.

The coupling between the individual boxes has a built-in flexibility of  $\pm 2^\circ$ , which means a boxwall can be drawn in curves. The curv radius then becomes 26 meters.

The boxwall can be placed on land that is already flooded, but if the ground surface is difficult to see through the water, you must take particular care to make sure that the boxes are not placed on uneven surfaces, on the wrong side of surface water drains, etc.

The boxes are easy to handle and move, and you can also adjust the setting of a constructed boxwall as long as the water has not started to press firmly against the base. But you must avoid dragging the boxes on the ground, as the sealing strips on the underside are vulnerable to wear and may become damaged.



## 2. Lay out the boxes and connect them one by one

Start from the left (seen from the dry side) and connect the boxes one at a time to the previous one. The boxes have a **coupling mechanism** (at the front) and a **locking mechanism** (at the top). Tip the box slightly forwards and connect it with the previous box by inserting the protruding "tongue" (on the far left) beneath the "bridge" (on the right-hand side of the previous box).

Now lean the box a little to the side, press down its rear edge and insert the pin of the locking mechanism into the groove in the previous box. Use your foot to hold up the right side of the box to be able to use both hands for the coupling maneuver. Turn the box so that the pin ends up in the middle of the groove. This is the normal position. However, the locking mechanism has a certain flexibility allowing the boxes to be turned  $\pm 2^\circ$  against one another.

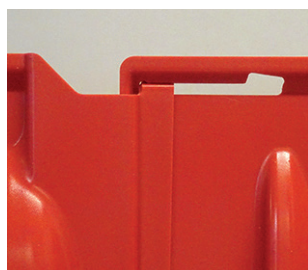
To help the sealing strip underneath create a tight seal against an uneven surface, you can place a weight on the front edge of each box, for example a stone or a sandbag. It can also be necessary to ballast the boxes in this way if there is a strong wind, before the water arrives. The boxwall is not very susceptible to winds coming from the front, but winds from behind will try to lift it.

Also when deploying a boxwall in deep water the boxes need to be ballasted from start to prevent them from floating. A difference in levels between the water in front of the boxwall and behind it is necessary to achieve the pressure difference that keeps the barrier in place.

If you want to improve the seal, you can cover the boxwall and its connections with a specific thin plastic sheeting, a liner. The sheeting for BW102 is 3.0 meters wide and can be fixed with clamps along the upper edge and with a line of gravel or sandbags on the ground in front of the front edge. By covering the boxwall with a plastic liner it can also be used on a much more uneven ground, as the liner is more flexible.



Assembly position



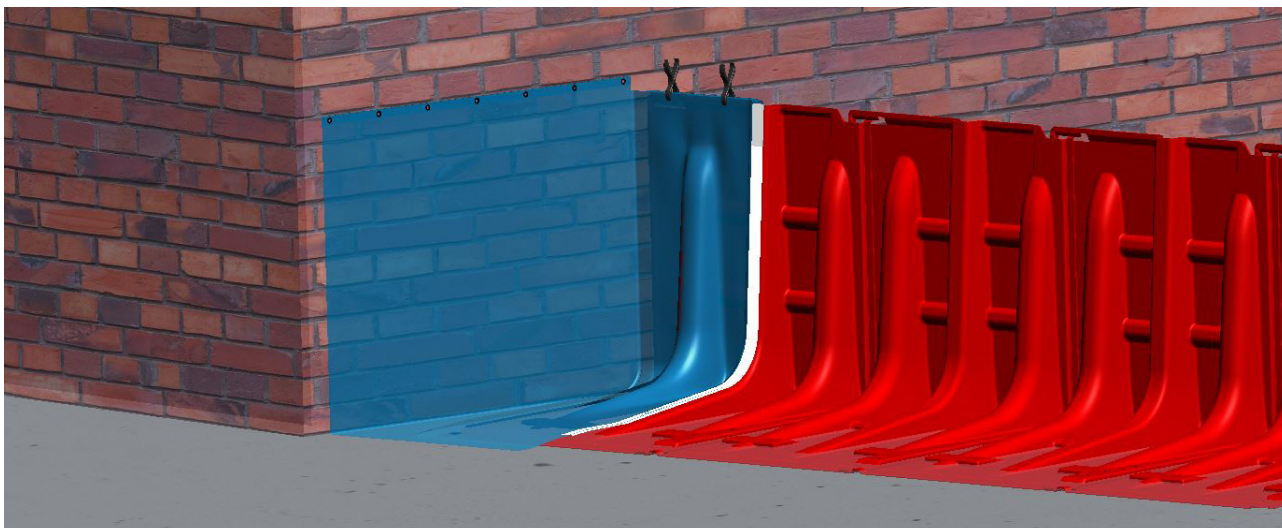
2° in one direction



Normal position



2° in the other direction



### 3. Connect to wall or facade

When connecting a boxwall to a wall or a building facade the connection need to be sealed and this is preferably done by using a special "wall cover", made of coated fabric. A such can be ordered as an accessory to the boxwall, and comes in two versions, for left and right ends of a boxwall.

The wall cover is attached up against the facade and clamped over the upper edge of the boxwall. The upper edge of the facade part of the wall cover has a row of eyelets to make it possible to hang it on screws or nails prefastened into the facade. It is recommended that the vertical edges of the wall cover should be fixed as well, the boxwall side edge by taping it to the middle bulge of the box, the facade side edge by nailing it to the facade or by piling sandbags or the like against it. Fastened this way the weight of the flood water will press the wall cover tight against the boxwall and the facade respectively. If needed a row of heavy objects, like sandbags, can be used to fix the front edge against the ground in front of the boxwall.

### 4. Pump away leaking water

When using mobile flood barriers you always need one or more pumps to pump away the water that will collect on the intended dry side of the barrier. A certain leakage will always occur, through the barrier, under the barrier and also through the ground itself. Upon this comes rain water that runs down towards the barrier but cannot reach the river or the lake as the barrier itself blocks the way. If the ground is level or if it slopes towards the flood, this water must be pumped clear with a pump. If the ground slopes away from the flood (e.g. on the crown of permanent embankments), the water will run away without the need for pumps.

Having a working pump in place is extra important if the space between the barrier and the protected object is small, for example when using a short boxwall in front of an entrance. Without a pump even a small leakage may lead to fast rising water levels on the dry side.

Be aware of any surface water drains or manholes and try to lay the boxwall behind such. If there is a risk that culverts might lead the flood water under the wall and into the protected area, these channels must be plugged or blocked.

## 5. Combine BW102 with BW52

The two boxwall models BW52 and BW102 can be combined. They are quite simply placed side by side and the connection is covered with a piece of liner to avoid leakage.

## 6. Combine Boxwall and Tubewall

NOAQ Boxwall can be combined with a NOAQ Tubewall. The walls are laid so that they overlap by a metre or so, ideally with the tubewall closest to the flood and the boxwall beneath and behind the tubewall. One or a pair of the tubewall's joint covers are used to form a seal between the two wall sections.



## 7. Flash flooding

The boxwall can also be used in flash flooding, when water is running fast over the streets. When this happens the most obvious measure is to protect low entrances and vulnerable objects by redirecting the water flow toward areas where flooding will cause less damage. A similar situation can occur when snow is melting, and the water tries to take unacceptable routes. As for the use in calm water, the boxwall should only be used on firm and even surfaces.

If water is already running fast at the place of the intended action, the first measure would be to place a number of boxes in the water flow, to break down the speed of it and reduce its power. Put the boxes close to each other, facing upstream, but do not try to connect them. They will be anchored directly by the weight of the water entering upon them.

Behind this protective row of boxes a continuous boxwall may then be assembled. When the boxwall is completed, the front row of boxes can be removed.

This way the boxwall can be used to lead away watermasses in a controlled manner down the streets, hereby reducing water levels and flood problems upstream. The boxwall does not need to be in the shape of one continuous barrier, a number of short boxwalls can be deployed just at the spots where the water needs to be redirected. For some stretches short overlapping sections of boxwall may also be an easier alternative to one long single barrier.

To divert the water off a street the boxwall may be deployed diagonally. The angle chosen, in relation to the direction of the current, depends on the amount of water and its speed.



## 8. Handling

The boxes fit into each other, which makes it possible to stack them very compactly. Larger volumes of BW102 are delivered in plywood cases measuring 2.15 x 1.47 x 1.14 meters (85" x 58" x 44"). Each case contains 32 boxes, or approx. 29 meters (95') of boxwall. The cases are also intended for storing the boxes.

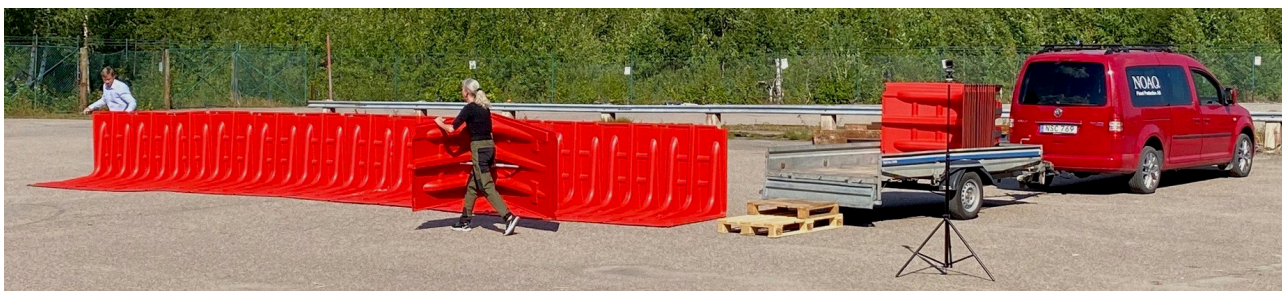
The cases are opened from the front. Start by loosening the seven buckles that hold the front in place. Then gently pull out the top of the front using the handle. Then lift the entire front, and remove it. Now all the boxes can be taken out, first the 16 on the right, then the 16 on the left.

The lid can also be removed, but it is not necessary. With the lid in place, the short sides are also kept in place. The short sides and the backside are fixed and cannot be removed.

Also the loading of the case is made from the front, first the 16 boxes that should stand to the left, then the 16 that should stand to the right.

A bar on the floor of the case helps to steer the first one of the 16 right hand boxes in place. This box should rest against the bar and be pushed all the way to the backside of the case.

Using a special carrying stick (two such are packed in every case) the boxes can easily be carried to wherever you want to have them.



## 9. After use

Disconnect the boxes. By leaning the right hand box (the one with the pin) against the left hand one, they are easily disconnected.

Rinse the boxes clean using a garden hose or by rinsing them in water, and stand them on their side to dry (when they are placed on the side the water runs off more quickly from the pores in the sealing strip). If there is a risk of temperatures falling below zero, the boxes must be taken indoors and stored in a heated area until all “soft parts” (soles and sealing strips) have dried out properly.

Inspect all soft parts. Damaged or worn sealing strips can be replaced, but worn soles should not, as the remnants may be hard to remove completely.

If the soles have become very worn, additional pieces of sole material can be attached to free spaces on the underside, marked on the photo to the right. Boxes, where the soles have suffered big damage, should be scrapped.

The boxes can be stacked to take up as little space as possible during transport and storage. The plywood cases, in which the boxes have been delivered, are also intended to be used for storing them.



### **Important!**

*Floods result from a course of events controlled by forces of nature that can only be controlled to a limited degree. Furthermore, no two events are the same, which means that all protective equipment must be used not only with good knowledge of its function and limitations, but also with generally sound judgement. Those who provide the equipment, manufacturers, resellers, hirers, etc. can never accept liability for the actual use and any possible personal injury or damage to property that might arise.*