NOAQ
Flood Protection AB

User Instructions

NOAQ Tubewall TW 50, TW 75, TW 100

A NOAQ Tubewall is a temporary floodwater barrier. The TW 50, TW 75 and TW 100 models can dam water to a height of approximately 50, 75 and 100 centimetres, respectively. Its light weight means that it can be laid out quickly to protect buildings and other property against water damage. It is not intended for permanent use, and the constituent sections (the tubes) must be properly maintained after each use, i.e. cleaned, dried and tested for leaks.

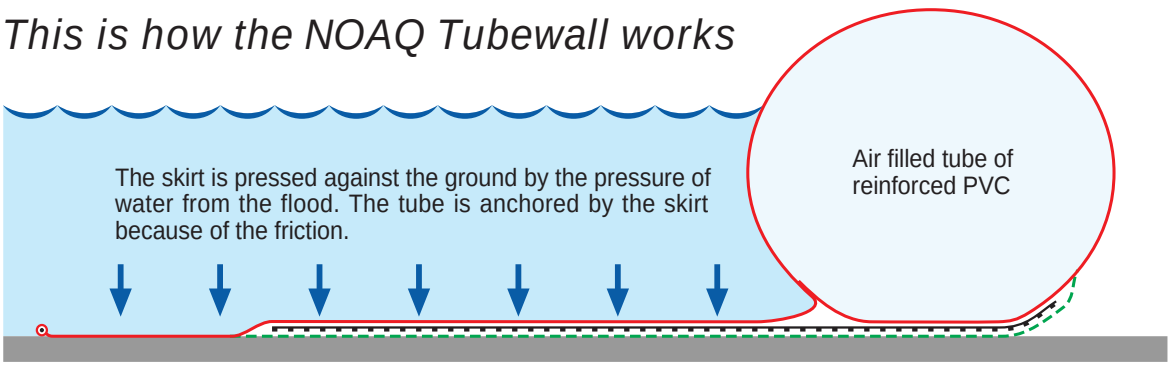
Each section consists of a damming part (the air-filled tube), an anchoring part (the skirt that lies against the ground on the flooded side) and a sealing part (the outermost yellow edge of the skirt). Each section also has a drainage layer on the underside, consisting of a sheet of shaped plastic and a net holding the sheet in place. Each tube has three connections for filling the tube with air, one at each end and one in the middle.

Two sections are connected by zipping a joint cover between them. The tubes themselves do not need to be connected. However, they do need to abut firmly onto each other in order to prevent the joint cover from being pressed out between them when the water rises.

A tubewall is constructed by connecting the tubes so they form a chain. You begin building from one end of the intended barrier, or from somewhere in the middle. Building the barrier from two directions should be avoided as the two wall ends must then meet exactly.

A laid-out section, empty or air-filled, can easily be moved as long as the water has not begun to press the skirt against the ground

This is how the NOAQ Tubewall works



Sealing
The outer part of the skirt is pressed tight to the ground to prevent leakage.

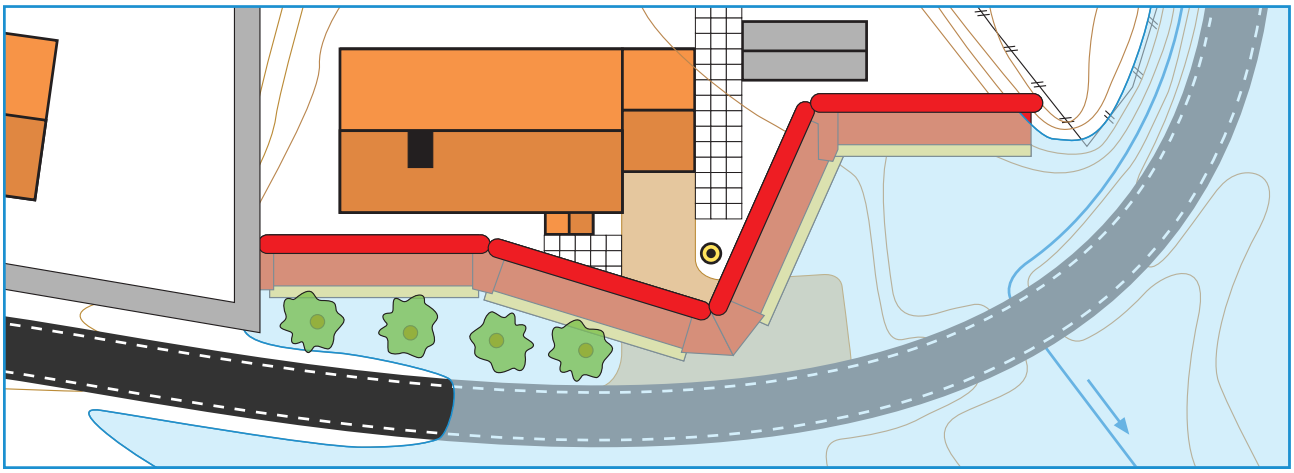
Anchoring
The stability of the construction is directly proportional to the difference of water pressure between the upper and lower side of the skirt. A patented drainage layer leads underseeping water out to the dry side.

Damming
As no uplift forces act on the damming part, there is no need for heavy weights. An air filled tube is easy to handle.

This is what you do:

1. Inspect the stretch of area where the tubewall is to be erected.

The NOAQ Tubewall can not only be pulled straight forward, but can also be dragged in zig-zag fashion around obstacles, along curved roads, etc. The individual tubes must be straight, but the joints between them can be freely angled up to 90° in both directions. To determine where and how a tubewall can be used, we have made a specific **check list**, which is available on NOAQ's web site (www.noaq.com).



The tubewall works well on most surfaces. Gravel and asphalt paths are acceptable, as are lawns and meadows. Sand on top of tarmac, however, must be brushed away from under the skirt. Ground that is prone to erosion, such as uncovered sand, as well as uncovered mud and clay, which may clog the drainage layer, should be avoided. Permeable surfaces, such as Macadam, should obviously be avoided. Any cavities or depressions should be filled in order for the entire tubewall to dam to the same level.

The ground under the tube and the skirt doesn't have to be exactly even, but the yellow outer sealing edge of the skirt must lie on an even surface to allow continuous close contact between the fabric and the sub-surface. Irregularities beneath the yellow sealing part, such as kerbs, can be filled in to reduce leakage.

The NOAQ Tubewall requires a strip of land of sufficient width (some 1.8 metres for TW 50, 2.4 metres for TW 75 and 3.2 metres for TW 100). This area must be free of obstacles such as trees, stumps, posts and so on. The whole skirt must be able to lie flat on the ground and must not be bent downwards around obstacles.

However, there is one way of dealing with narrow passages. The joint cover does not extend as far from the tube as the skirts (especially in the larger models). If you can plan where the individual tubes are to lie, you can make sure that individual, awkwardly located trees or posts remain in the open between two skirts, just in front of a joint.

The air-filled tube must not lie too close to the corner of a building, protruding stubs or the like, as it will twist backwards as the water rises. If it does lie against an obstacle, it can be worn through if waves make the tube move for a great length of time. The air-filled tube can be protected with a joint cover or the like where wear and tear may occur.

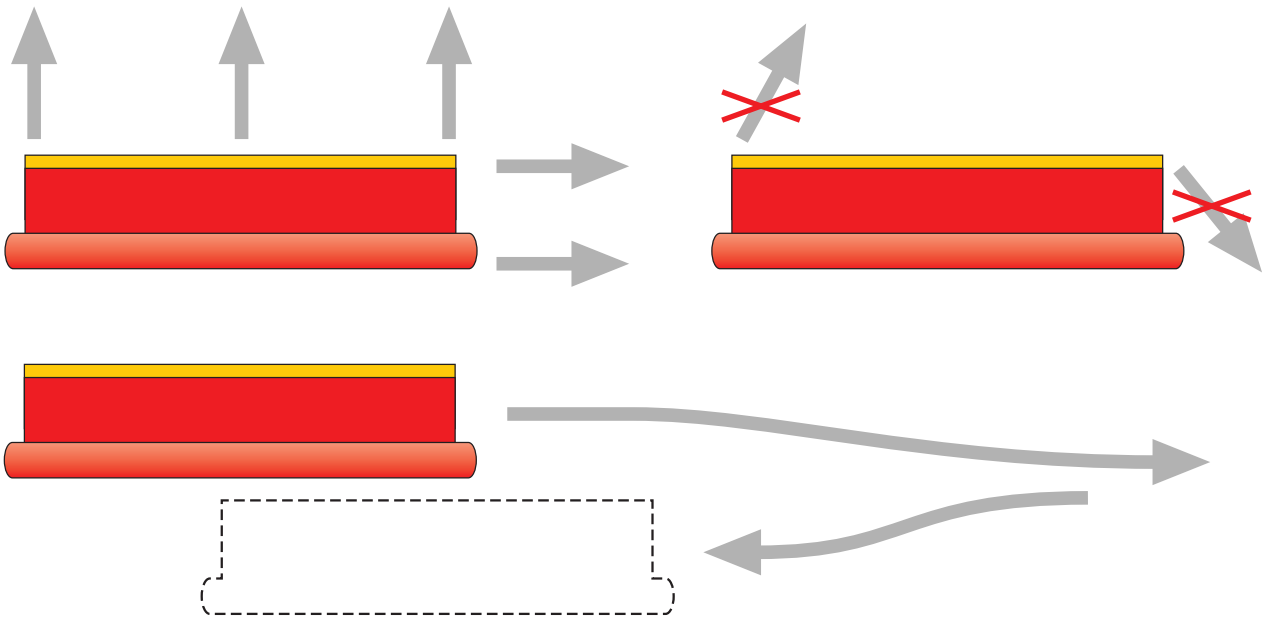
It is also important to ensure there are no sharp stones or other objects protruding from the ground underneath. If you have to remove bushes where the tubewall is to be dragged along, you should not cut them just above ground level, but rather pull them up by their roots.

2. Bring the rolled up tube to the proposed location.

Depending on the model, 2-3 people are required to carry a 10-metre tube, and 4-6 people for a 20-metre tube. You can carry the rolled-up tube in its transport bag, or with the aid of loose loops or straps threaded beneath the roll. The easiest way is to carry it on a stretcher, or on a stretcher-like device by simply connecting two rods with suitable straps.

3. Roll out the tube section and adjust its position precisely.

A tube can be moved by dragging it along the ground. It should only be dragged parallel or perpendicular to the way the wall is facing. **Don't pull the skirt diagonally.** If the skirt develops folds or creases while dragging the section, the drainage layer's plastic sheet may slip out of position or twist. This may jeopardize the draining ability of the layer, and thereby the safe anchoring of the tube. If you need to move a section sideways, the easiest way is to pull it up into a slight arch along its length and then pull it backwards again into the desired position (like moving a car sideways by moving it back and forth).



4. Inflate the tube using the hand-held blower.

The blower makes use of ordinary 220V current (or 110 V). Attach it to an electrical outlet, together with an extension cord, if needed. If the cord doesn't reach the tube, it could be inflated at one place and then dragged over the ground to its proposed location. Please note that at least one of the tubes in the constructed wall must be reachable by the cord, in case the air pressure has to be maintained later on. The blower is also available in a battery-powered version.

The valves of the tubes include a backflow prevention function. To set a valve to the open position, press the lid inside the valve and twist it clockwise. Make sure the valve in the other end of the tube is closed. Add air until the pitch of the blower rises, meaning that it's unable to raise the pressure any higher. This will take approx. 1.5 minutes for a (10 metre) TW 50, approx. 3 minutes for a TW 75 and approx. 5 minutes for a TW 100. Remove the blower and close the valve by pressing the lid and turning it counter-clockwise. **Make sure that the blower and any other electrical connections do not come into contact with the water.**

The pressure should be within the interval 5 - 10 kPa (50 – 100 mBar, 0.5 - 1 metre water column or 0.4 - 1.4 psi). If you use another type of air pump, such as a compressor, you must ensure that you stop pumping air in before the pressure becomes too great. The maximum permitted pressure is 15 kPa (150 mBar, 1.5 metre water column or 2.1 psi.

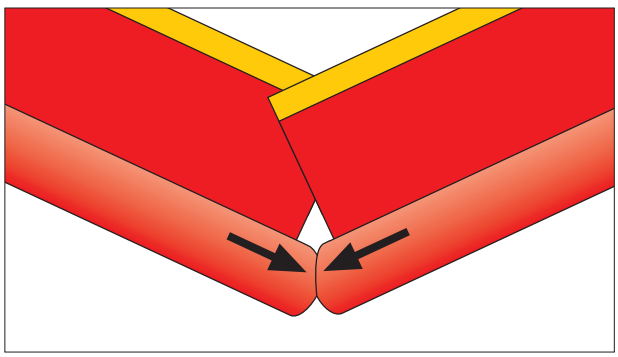
5. Secure the tube if necessary.

If there is strong wind, the tube may need to be secured by laying stones, some gravel, concrete slabs, metal panels or other weights along the edges of the skirt. This may also need to be done if the skirt is lying in water (particularly in flowing water) as the device will only be anchored firmly once a difference in water levels, between the ”wet side” and the ”dry side” of the tube, is established. When the tube section is placed on heavily sloping ground, it may also need to be secured.

If the water is rapid-flowing it is especially important to secure the edge of the skirt so that the flowing water does not have a chance to split open the skirt. Ideally use weights with a low profile, such as iron panels or concrete. However, please note that a tubewall is mainly intended for still or slow-flowing water. It can be used to dam water that is flowing in the same direction as the tubes, but must never be used for the purpose of trying to brake or stop a water flow.

6. Next tube…

Lay out the next tube by repeating points 1 - 4 above. It is important for the second tube to lie close to the first tube so there is no space between the sections where floodwater can press down on the joint cover. This is particulary important when making corners as the tubes will twist backwards somewhat when water is rising. **The ends of the tubes must press firmly against one another.**



The eyelets at the end of the tubes do not have to be used under normal conditions. If, however, a gap appears between the tubes as the water rises (because you were careless in the previous point!), you can use the eyelets to tie together the two tubes using rope or straps, to prevent the joint cover from being forced in between them.

Tubes of different sizes can also be used together, which is suitable if the height conditions vary along the wall. In this instance the tubes are laid so that their centre lines meet.

7. Connect the tubes, using the air hoses.

This is optional but enables you to monitor the air pressure from one point when a number of tubes forms a continous air volume.

8. Connect the skirts by using a joint cover.

The joint cover is connected to both skirts by means of zip fasteners. If the joint is straight, i.e. the tubes are aligned, only one joint cover is required. The same applies if you fold the joint **towards** the flooding. You will then have excess cover, which will have to be arranged in one or more neat folds. These will later be pressed flat by the rising water but initially you can weigh the folds down with suitable material, e.g. a brick, stone or sandbag. If the joint is twisted **away from** the flooding, two or more joint covers are required.

A joint cover must not be stretched between the zips of the skirts. If it is stretched, a further joint cover must be used. **The zip must be protected from forces that will tear it apart.**

The same joint cover is used for all models. It can also be used to join together two tubes of different models.

There is a special joint cover for rapid-flowing water, which is as wide as the skirts that it brings together, in order to protect the corners of the skirts from being forced open. The outer side of this joint cover is also longer (in the longitudinal direction of the wall) so that it can be laid overlapping each skirt: below the skirt is upstream and above the skirt is downstream.

9. Pump away the leaking water from the dry side.

If the ground slopes downwards towards the flooding (the normal case), the water that has leaked beneath the tube will collect behind it. This water must be drained away before the level rises. If the water level on the “dry” side is allowed to rise, the tube will gradually attempt to float and lift its skirt with it. If the ground slopes upwards towards the flooding (e.g. on the ridge of an earthen embankment), the leaked water will run away naturally.

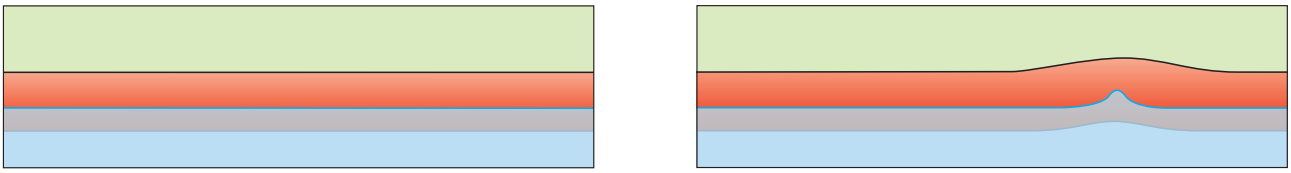
10. If necessary, tighten the edge of the skirt.

When the water level is low the resultant water pressure is low against the skirt. If the ground is uneven at the time, or if the turf is thick, the edge of the skirt will not remain pressed tightly against the ground. To reduce ground leakage, you can weigh down the skirt’s yellow sealing edge using something heavy e.g. a chain, brick, stones, sandbags, sand or gravel. This may be necessary if your pumping capacity is insufficient to cope with the water leakage. Once the skirt starts to “seal” to the ground, the leakage will diminish. The higher the floodwater rises, the better the seal will be.

To further reduce the amount of water leaking through the wall you may also cover the zips with tape.

11. Monitor the tubewall.

It is particularly important, of course, for the tubes not to leak air. It is important to be aware that **if a leak does occur it does not become evident by the tube starting to deflate.** The water pressure from the flooding will cause the tube to still appear swollen. The first sign of an air leak appears as a change in the shape of the tube, i.e. the straight tube gets a bend or begins to look sway-backed.



Temperature differences also cause pressure changes. When the temperature falls at night, the pressure in the tubes also falls a little. By the same token, a tube that is filled at the correct pressure on a cold morning can reach a pressure that exceeds the recommended maximum when the sun is at its strongest. However, the tubes can withstand this overpressure.

12. NOAQ Pressure Guard.

To control the internal air pressure in a tubewall a Pressure Guard has been developed. It contains a blower which automatically switches on when the air pressure drops below a certain level and switches off again when the pressure is restored. It runs on 220 V current and is connected to the tube system by the same kind of hose that interconnects the tubes. Any active air leak will be revealed by the pressure guard switching on and off for short intervals of time.

Please refer to the separate instructions for using the NOAQ Pressure Guard.

13. Damage and repair.

If an air leak occurs during service and no measures are taken, the tube will gradually lose its damming shape and the tubewall will eventually fail whether the leak is on a dry part of a tube or underwater. The amount of time elapsed for this course of event to occur will depend upon the size of the hole and the actual water level.

A small leak may not be possible to locate and may not need to be repaired at all. The internal pressure simply needs to be maintained by adding air at regular intervals. Should a major leak occur, it is necessary to plug the leak. The measures to be taken in this case are, in order:

Step 1 - Add air continuously

The blower has the capacity to prevent the pressure from dropping, even if there is a major leak. This will allow you to restore the pressure before mending the hole. A steady air supply will stabilize the situation, allowing time for inspecting the damage, deciding what to do, fetching the repair kit, etc. The fabric is reinforced so there is no risk of a tear to increase in size due to increased strain on the fabric.

Step 2 - Plug the hole

The easiest way to reduce the air leakage from a major tear is to block the hole with anything that is to hand. A piece of sponge works well, and one is included in the repair kit. Cut a piece that is sufficiently big for it to fit into the whole and then expand both inside and outside the hole. By this simple action the airflow will be reduced by more than 90%. This method works equally well for leaks above and below the water level. For minor leaks, skip this measure and go straight to step 3.

Step 3 - Repair the damage

Wipe away dirt from around the hole and cover it with plastic-coated tape (which works under water as well). A roll of such tape is included in the repair kit.

14. After use.

Before the tubes are stored away they need to be inflated and washed clean. A good idea is to do this on sloping ground to allow the water to run off the skirt. The drainage layer's plastic sheet may be pulled out of its net pocket and cleaned separately from the skirt. By attaching a rope to the short side of the sheet, it can easily be reinstalled. It is important that you make sure that the side of the sheet with studs faces downwards.

Make sure the tubes are airtight by letting them lie inflated for some hours. If a tube is losing air, the leak can be located by listening for a "hissing" sound, or by spraying the tube with soapy water. Mark the leaking area with a pen.

Once the area around the hole is cleaned and dried, it can be repaired with LiquiSole™, Aqua-Guard™ or other kinds of urethane-based glue. There is one in the repair kit. Follow the instructions for each product. When the tubes are dry, they should be rolled together and stored in a dry place where they will not be exposed to direct sunlight. The plastic sheet can easily become creased when you roll up the tube, but if you pull it at the same time as you roll up the tube, you avoid this happening.

If the equipment is not used for an extended period (more than 6-9 months) it should be inspected to ensure it is in good working condition. Complementary devices such as pumps, cables, etc. also need to be checked. Regular training for those using the equipment will ensure they are familiar with proper use of the tubewall.

Important!

Flooding is a course of events ruled by natural forces that man can only manipulate and control to a certain degree. Furthermore, no two events are alike. All protective equipment must be handled not only in a professional way according to the instructions laid out in this user guide, but also with a great deal of common sense. Manufacturers, retailers and renters of this equipment cannot be held liable for damage to people or property that may result from its use.