INSTALLING ANTI-WATER DEVICES

HAZARD

RAINFALL AND FLOODS

COASTAL DYNAMICS

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

BUILDING IN OPERATION

AREA OF ACTION

GROUND FLOOR

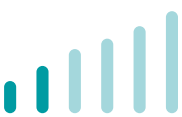
BASEMENT

COST

€ € €

low medium high

LEVEL OF SKILL



low

When a building is exposed to the risk of floods or coastal flooding and it isn't possible to keep it out of the reach of water, anti-water devices can be installed to limit the damage caused by water and/or salt. This involves obstructing all the openings through which water is likely to enter in order to delay or prevent water penetrating the building. These devices are part of the water-resistant strategy and can be used in new or existing buildings.

IMPACTS

The devices put in place to limit the penetration of water make it possible, to a certain extent, to **preserve the interior of the building** and to reduce, sometimes considerably, the time taken to return to normal.

However, the effectiveness of such systems is subject to a number of conditions:

(1) the **maximum water depth** must not exceed 1 metre;

(2) The **duration of submersion** must be limited (no more than 48 hours);

(3) the **warning time** (time between the announcement of the arrival of water and its actual arrival at the building) must be sufficient to allow temporary obstruction devices to be put in place.

If one or more of the conditions listed above are not met, there could be major consequences for both materials (damage to interior spaces or the building structure) and humans (endangering of occupants' physical integrity).

INSTALLATION GUIDE

To limit the penetration of water into buildings, we recommend that you:

- Check the efficiency of the **crawl space ventilation system** and install a blackout system.
- Install **check valves** on wastewater and rainwater drainpipes to prevent wastewater from flowing back into the building.
- **Cover low openings** in the building with removable covers (window wells, air vents).
- Avoid doors and windows, and use **fixed or removable cofferdams**.
- Install an **automatic blocking device** on the fuel tanks, anchored to a reinforced concrete base.

You can also **build a low wall** around the building to protect the walls and openings from the force of the current.

As the effectiveness of removable anti-water devices such as cofferdams depends in part on the **ability of building occupants to react** in the event of severe weather, it's advisable to make users aware of the climate risks to which they are exposed and of the emergency systems that have been put in place.

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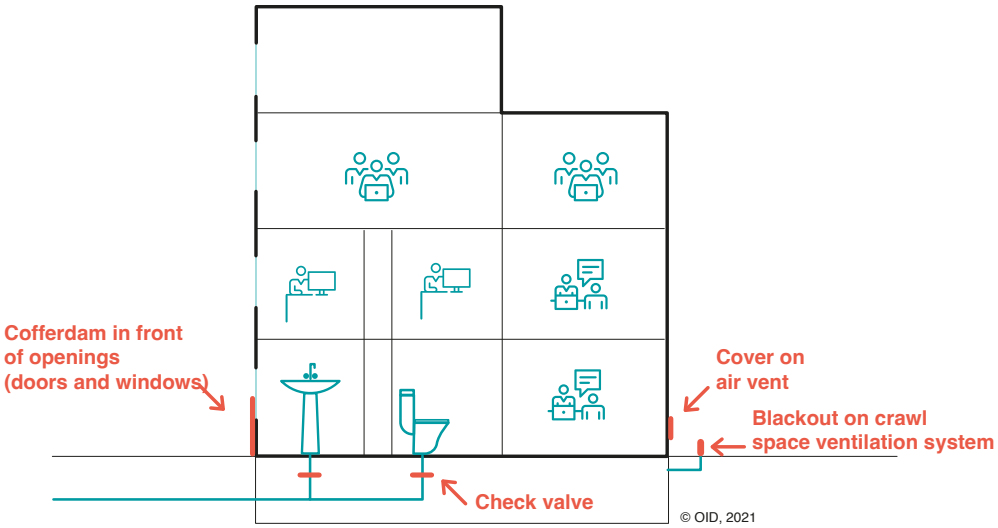
ILLUSTRATION OF DIFFERENT ANTI-WATER DEVICES



WEAK POINTS AND STRONG POINTS

⊖ The installation of waterproofing devices can **encourage occupants to remain in the building**, which is dangerous. The lives of people inside the building can be put at risk if the devices malfunction or if the water rises higher than the devices: people then find themselves trapped in a building filling with water.

⊕ The installation of anti-water devices must therefore **comply with the effectiveness conditions mentioned above** and be accompanied by the creation of a refuge area, if possible with access to the outside (skylight, trap door, etc.).

⊕ **Anti-water devices can fail**, which is why it is recommended to locate essential equipment on upper floors or to put them above the highest known water level. To protect networks, anything situated below 1 metre (gas, electricity, telecoms) should be waterproofed.

⊕ The *Fonds de prévention des risques naturels majeurs (FPRNM)*, known as the Barnier Fund, provides financial support for measures to prevent and protect against major natural hazards according to the framework established by the law. It is available to local authorities, small businesses, private individuals, public land agencies and government departments.

MALADAPTATION

Maladaptation can result from the following:

Hydraulic overpressure

When water comes up against the anti-water devices installed to block the building's openings, hydraulic pressure can build up. If the devices can't withstand this pressure, or if it becomes too high, this can have a negative impact: stress on walls and foundations, cracks in walls, floors and ceilings, risk of water infiltration, structural deterioration, and permanent deformation or major damage.

Water diversion

The use of anti-water devices to protect a building can divert water to other parts of the site or neighbouring unprotected buildings, increasing the risk of flooding in these areas. The transfer of vulnerability can also affect surrounding infrastructure, farmland and equipment. An integrated approach to risk management is essential. This involves looking at the whole site and coordinating efforts with neighbouring owners and local authorities.

Neglect of long-term resilience strategies

Although useful in the short term to protect a building from imminent flooding, installing anti-water devices can delay the implementation of permanent measures that are essential to strengthening the building's resilience to future flooding and climate change. It is therefore important to consider them as temporary and complementary, adopting a holistic approach that integrates different strategies to reduce vulnerability in the short and long terms. In addition to these devices, the implementation of permanent structural measures, such as raising the height of buildings, provides long-term protection against flooding caused by climate change.

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MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- CREATE A REFUGE AREA WITH ACCESS TO THE OUTSIDE (SKYLIGHT, TRAPDOOR, ETC.)
- CHECK THAT ANTI-WATER DEVICES ARE IN GOOD WORKING ORDER AND READY FOR USE IN THE EVENT OF FLOODING

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/– : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS	INTERPRETATION
+/– Percentage of floor openings fitted with fixed or removable cofferdams (%)	To be maximised
+/– Percentage of crawl space ventilation systems with blackout system (%)	To be maximised
+/– Percentage of wastewater and rainwater drainpipes fitted with check valves (%)	To be maximised
+/– Percentage of removable covers available to conceal all low openings (window wells, air vents, etc.) (%)	To be maximised
+/– Percentage of oil/water tanks with automatic shut-off (%)	To be maximised

INDICATORS OF RESULTS	INTERPRETATION
+/– Depth of water reached in the building during a flood (cm)	To be minimised

FIND OUT MORE

AdaptaVille (2021), *Installer des batardeaux et des barrières anti-inondations*

Centre Européen de Prévention du Risque d'Inondation (CEPRI) (2010), *Le bâtiment face à l'inondation, vulnérabilité des ouvrages. Aide-mémoire*

Cerema (2016), *Référentiel national de vulnérabilité aux inondations*

Episeine (2023), *Dispositifs de protection contre les inondations : particuliers*

Sustainable Buildings Initiative, Flood Barriers

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