OID ŒUVRER POUR L'IMMOBILIER DURABLE

UNCOUPLING STRUCTURAL ELEMENTS

HAZARD

GEOTECHNICAL DROUGHTS

IMPLEMENTATION STEP

CONSTRUCTION RENOVATION

AREA OF ACTION

FOUNDATIONS ENVELOPE

COST

€ € €

low **medium** high

LEVEL OF SKILL

high

When a building constructed on clay soil has adjoining structural elements (garage, veranda, etc.), these must be separated from the main building by an isolation joint so that each part of the building can absorb the differential settling associated with soil movement. This is because on land exposed to shrink-swell, the heterogeneous water content of the soil leads to differential soil movement.

IMPACTS

Installing an isolation joint allows the building to adapt to ground movements, by allowing each part of the building to move freely, **thus limiting the risk of structural damage.** If the structure of a building is too rigid, ground movements can lead to cracks at the junction between structural elements, or worse, to the detachment of adjoining buildings.

INSTALLATION GUIDE

When a property is located on land exposed to shrink-swell, it is important to **install an isolation joint** between all parts of the building that have different foundations or exert variable loads (i.e. do not have the same weight). It is also highly recommended to **install an isolation joint when planning an extension to an existing building**. In general, to prevent cracking of the building structure, **expansion joints** (not specific to the risk of shrink-swell) can be **installed** to absorb deformations of the building due to temperature variations. If the building is located in a seismic zone**, seismic joints** can be **installed** instead of isolation joints.

When an isolation joint is installed, the two parts of the building are totally uncoupled because a gap is created between the blocks that make up the building. An elastomer seal is then inserted into this void.

To be effective, an isolation joint must be **installed along the entire height of the building** (including the foundations).

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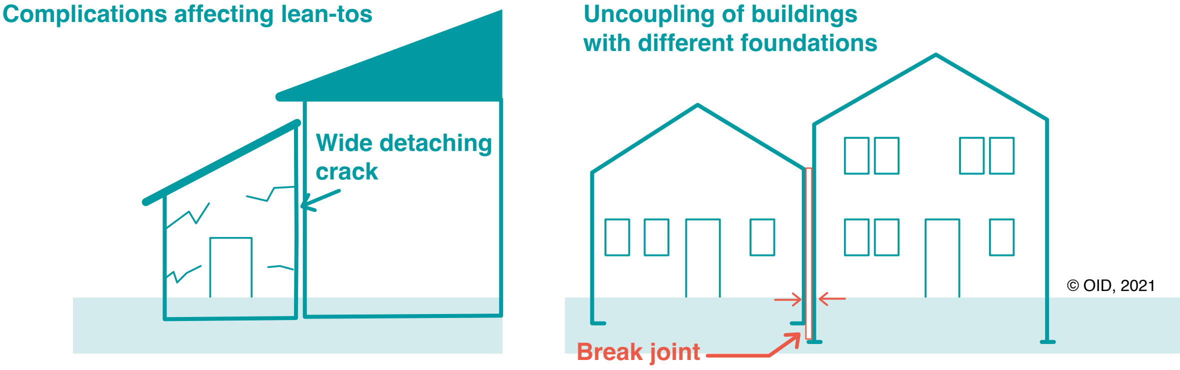
ILLUSTRATION OF COMPLICATIONS AVOIDED AND UNCOUPLING OF TWO BUILDINGS



Source: French Ministry for Ecological Transition (2008)

WEAK POINTS AND STRONG POINTS

- (−) Installing an isolation joint on an existing building is an **expensive and difficult operation**, as it involves underpinning the foundations, which could destabilise the building. It's therefore easier to install as part of a construction project.

- (+) Isolation joints are **particularly suitable for buildings with a large footprint** (several hundred square metres on the ground).

- (+) In order to minimise damage caused by soil movement, devices to control soil moisture levels and devices to rigidify the building structure can also be installed. The building foundations must be adapted to the risks identified.

MALADAPTATION

Maladaptation can result from the following:

Long-term structural problems

The use of isolation, expansion or seismic joints in a building can create weak points due to the accumulation of debris, damp, and vulnerability to water infiltration. The materials used for joints can degrade over time due to environmental conditions (UV rays, temperature variations, etc.), making them less effective. Lack of regular maintenance and external factors (seismic movements, vibrations linked to traffic or human activities, etc.) may affect the stability of these joints and therefore contribute to long-term structural problems.

Inadequate climate change adaption measures

The impacts of climate change, such as an increase in the frequency and intensity of extreme weather events (e.g. storms, floods and droughts) can have significant effects on ground movements and the structural responses of buildings. If isolation joints are not adapted to cope with these changing climatic conditions, this could lead to problems with structural stability, damp and even premature deterioration of building components. To prevent this, it is imperative that construction and design experts incorporate climate forecasts and climate change uncertainties into the design and installation of joints, while including safety margins to cope with the most extreme climate scenarios.

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MONITORING INDICATORS

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/- : Quantitative indicator ★ : Qualitative indicator

	INDICATORS OF MEANS	INTERPRETATION
+/-	Percentage of isolation/ seismic/expansion joints between all parts of the building that do not have the same foundations or with variable loads or a project to extend the existing building (%)	To be maximised
+/-	Percentage of cracks wider than 1 mm and/or longer than 10 cm (%) that are monitored	To be maximised

	INDICATORS OF RESULTS	INTERPRETATION
+/-	Number of cracks wider than 1 mm and/or longer than 10 cm at junctions between structural elements	To be minimised
+/-	Total number of cracks wider than 1 mm and/or longer than 10 cm	To be minimised
+/-	Number of cracks wider than 1 mm and/or longer than 10 cm that have widened and/or lengthened	No widening of these cracks over time
+/-	Width of visible distance between adjoining buildings (mm)	To be minimised

REGULATION / CRITERIA

- **Cracks wider than 1 mm** should be monitored more closely. The length depends on the component concerned, but it's advisable to monitor cracks of 10 cm or more (Baticopro, 2020).

TOOL

- A **crack-width gauge** is a device used to measure and monitor the opening or gap of a crack in a structure. It usually consists of a graduated scale attached to either side of the crack and a movable indicator to accurately measure the gap between each side of the crack.

FIND OUT MORE

BRGM (2009), *Rapport final du projet ARGIC (Analyse du Retrait-Gonflement des Argiles et de ses Incidences sur les Constructions)*

Ifsttar and Ineris (2017), *Retrait et gonflement des argiles – Analyse et traitement des désordres créés par la sécheresse*

LAVARDE, C. (2023), *Rapport d'information fait au nom de la commission des finances sur le financement du risque de retrait gonflement des argiles et de ses conséquences sur le bâti* (Information report on behalf of the Finance Committee on the financing of the risk of clay shrinkage and swelling and its consequences on buildings).

OID (2024), *Fiche aléa – Sécheresses et RGA (Droughts and shrink-well of clays)*