

5. Dilatation of Buildings

Dilatation of Buildings

- **The construction joint** - distance between the two building blocks.
- **The expansion joint** - divides buildings (parts) into smaller rigid units.
- **Unforced effects** include:
 - Volume changes due to temperature
 - Volume changes due to moisture
 - Rheological effects (creep and shrinkage)
 - Changing the shape of the foundation joint (bottom surface)
- **Expansion joints** eliminate: Static effects x Dynamic effects x Acoustic effects x Heat-technical effects.

Volume Changes

- **Volume changes** can be caused by:
 - Changing the temperature of the external and internal environment (thermal expansion of materials).
 - Changing the moisture of the materials (drying and swelling)
 - Rheological changes of the materials (Shrinkage x Creep)
- **Stress elements** due to volume changes can lead to:
 - Element breakage by tensile cracks
 - Compression element failure
 - Expanding effect on surrounding structures
 - Creation and expansion of joints between element and surrounding structures
 - Rheological changes of materials

Structural principles and structural solutions

- **Maximum distance of expansion joints** in masonry with lime mortar:
 - burnt bricks 100 m
 - sand-lime bricks 50 m
 - concrete blocks 50 m
 - natural stone 60 m
 - reinforced concrete 40 m
- **Construction design** of the expansion joints:
 - Duplication of supporting structures
 - Unilateral sliding fit
 - Cantilevered ceiling structure
 - Inserted field with slide bearing

Uneven Settling

- **Irregularities in the substructure of the object** - irregular and oblique loading of soil layers with different compressibility, different levels of groundwater level, undermined area, additional changes in the subsoil or level of ground water level.
- **Different loads in the footing bottom** - different height of the part of the building, different utility loads in different parts of the building, inappropriate design of the area of individual flat foundations
- **Different foundation structures of parts of the building** - the combination of shallow and deep foundations
- **The time interval between the realizations of the different units of the building** - the new part follows the older one, where the settlement has already taken place.

Structural principles and structural solutions

- **Design principles for expansion joints:**
 - Expansion joints must allow vertical displacements
 - Expansion joints pass through the whole object, including the foundations
 - Foundations must not interfere with one another
 - Must comply with the required thickness joints
- **Design solutions** for the implementation of expansion joints:
 - Sided cantilevered horizontal structures
 - Reversible cantilevered horizontal structures
 - Fields inserted
 - Modulation adjustment