thermal break elements

essence of thermal bridges: multidimensional heat flow (uneven heat distribution)

cause: e.g. change of materials – different heat-conducting materials

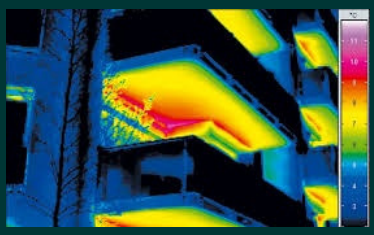
consequences: discoloration (dust sitting on), condensation (dew point), mold formation (not healthy), higher heat loss

most common

structural: structures joining the slabs for proper static operation (slabs, beams, balconies, loggias, canopies)

doors and windows, ventilation

geometric: wall corners, wall-floor corners, corners along the floor



thermal imagery of a cantilevered balcony – RC slab runs to outdoor space without thermal break

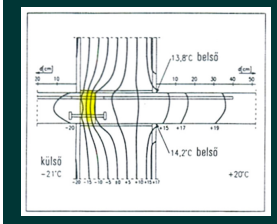
avoiding thermal bridges

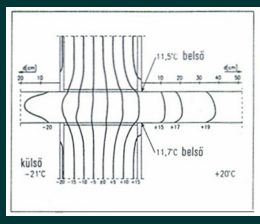
for structures connected to the floor:

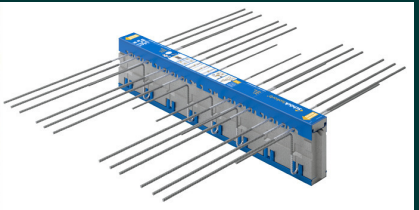
slabs: wrapping with thermal insulation or using thermal break elements

beams: wrapping with thermal insulation (with thermal break elements!)

ring beam, lintels: thermal insulation placed in the formwork + thermal insulation of exterior wall







isotherms with or without thermal break elements – balcony slab

thermal break element

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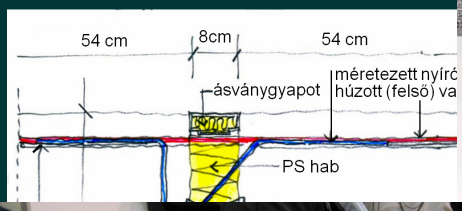
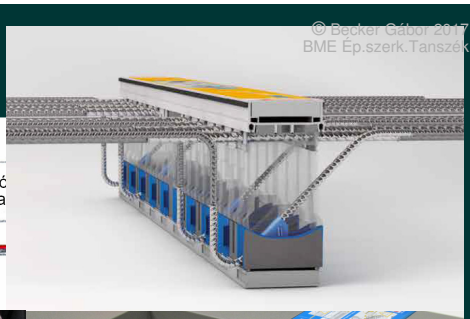
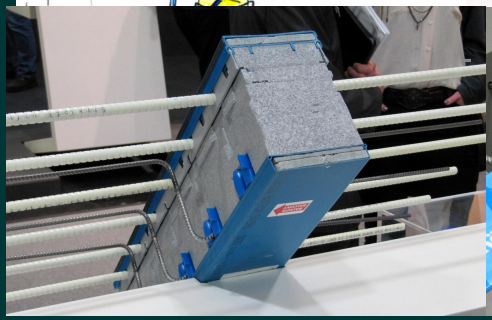
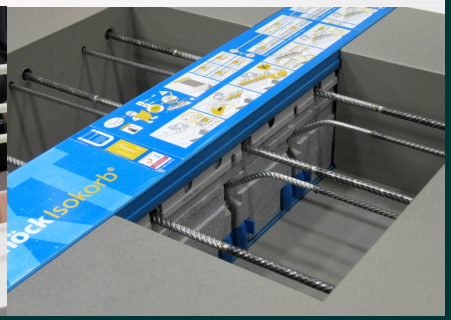
thermal break elements

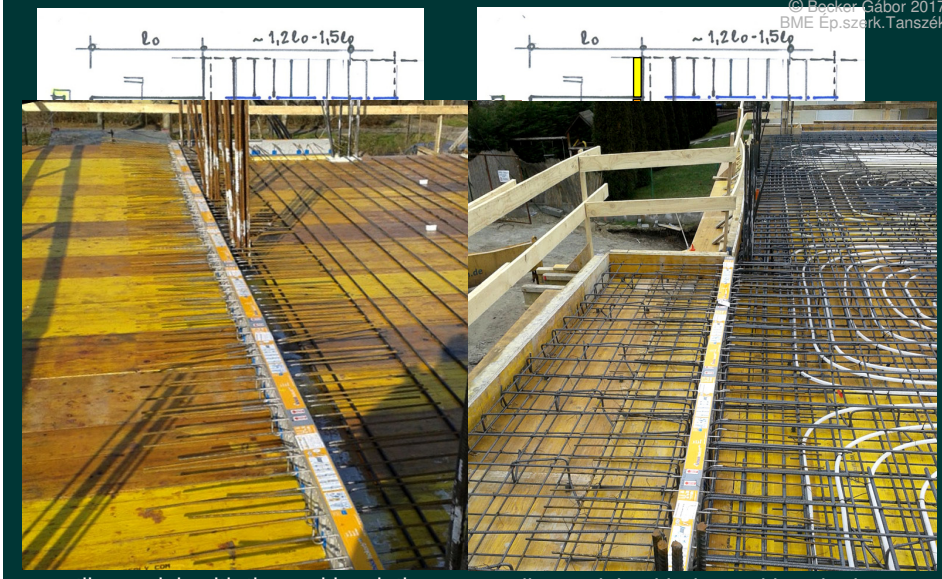






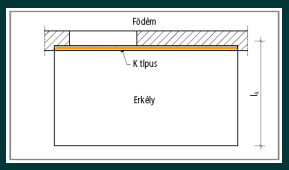


construction of thermal break elements

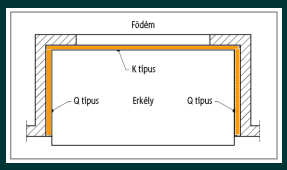


cantilever slab with thermal insulation wrap

cantilever slab with thermal break element

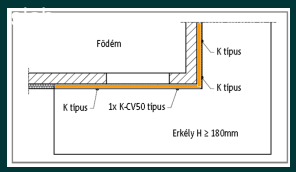


cantilever

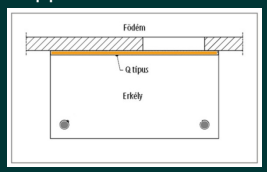


supported on 3 sides

the geometry of reinforcement for a variety of forces and geometries: cantilever, only sit on the wall, cantilever and sit on the wall with plane change, to attic wall etc.



two-way cantilever slab



supported on 2 sides

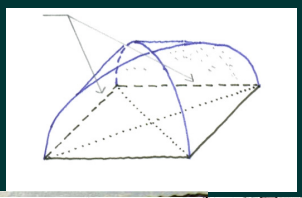
advantages: no need of thermal insulation around balcony (+ waterproofing), slimmer construction, quick and easy installation

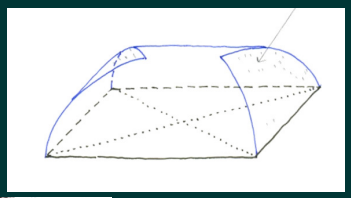
disadvantage: relatively expensive, less freedom in geometry and force arrangement

vaults

can be derived from arched surfaces

from cylindrical

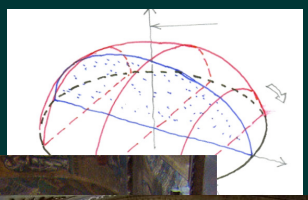


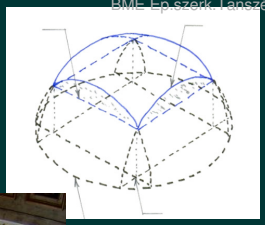


vault

vaults

from spherical



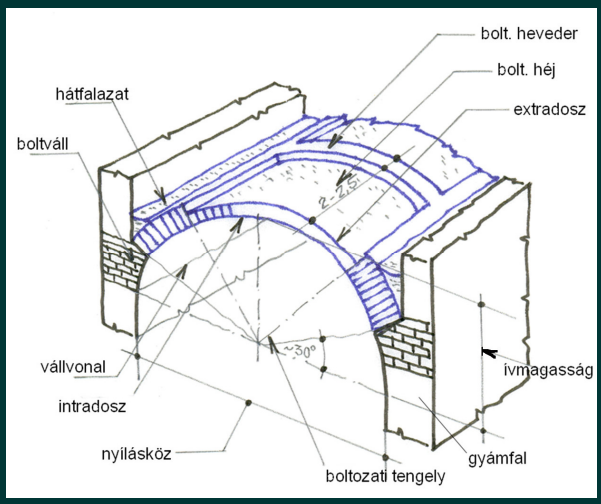


emian vault

structure of vaults

origin:
"stretched arch" → the concepts are the same

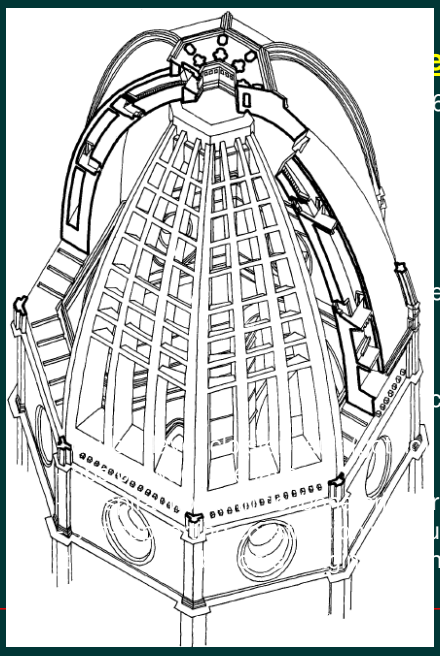
material of vaults
- historical structures: brick and carved stone
- today (e.g. transport facilities) prefabricated RC concrete
- in modern architecture: shell vaults with small thickness, (monolithic RC, based on the force model of an egg shell)
- false vaults: wire-lattice structure
- small clear span, flat arch: Cambered vault



taking the lateral thrust (shoulder comp

od
unt

removed only after that



lateral thrust of vaults
non-flat floors – vaults

beam - hollow block floors
beam floors prefabricated in full cross-section

tensioned beam floors:

- beam E – span module unit:60 cm; spacing 60, 30 cm, concrete hollow block
- beam PPB – span module unit:60 cm; spacing 60 cm, concrete, clay, wood-concrete hollow block
- tensioned RC beams – the mechanism and effect of tensioning

semi-prefabricated beam floors:

- „Master" floor – span: 1.20 - 8.90 m modular unit: 20 cm, concrete hollow block 59 (57.5) cm spacing, height m=19 cm
- Porotherm – modular unit: 25 cm hollow blocks spacing: 60 and 45 cm

concrete plank slabs

- tensioned RC hollow-core floor slabs
- formwork panel slabs

summary 1
floor structures 2: RC floors and vaults

thermal break elements

- essence of thermal bridges: multidimensional heat flow
- cantilever slabs joint to floors
- avoiding thermal bridges: thermal insulation around or thermal break element
- construction and types of thermal break elements
- installation and application of thermal break elements

vaults

- types of domes: domes derived from cylindrical and spherical surfaces
- structure and parts of vaults
- taking the lateral thrust of vaults

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