

Gábor Becker PhD / Gyula Dési titular Docent

BUILDING CONSTRUCTIONS 1

Floor structures 2: RC floors and vaults

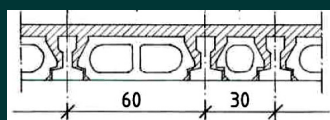
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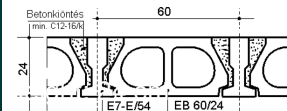
Budapest University of Technology and Economics
Faculty of Architecture Department of Building Constructions

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

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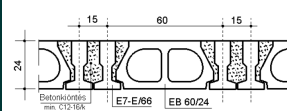


Az E7-E/54 jelű gerenda beépítése
540 cm-es falköznel



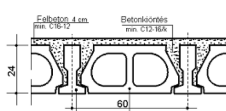
span:

Az E7-E/66 jelű gerenda beépítése
660 cm-es falköznel

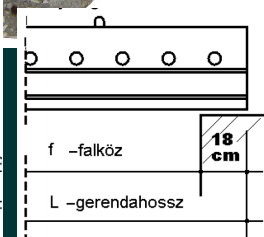
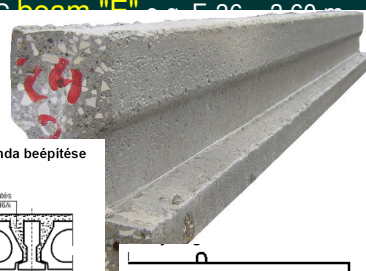
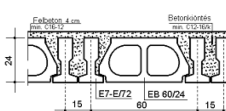


tensioned RC beam "E" (19 cm high)
span: 2.40 m
filler blocks
24 cm side

Az E7-E/60 jelű gerenda beépítése
600 cm-es falköznel



Az E7-E/72 jelű gerenda beépítése
720 cm-es falköznel



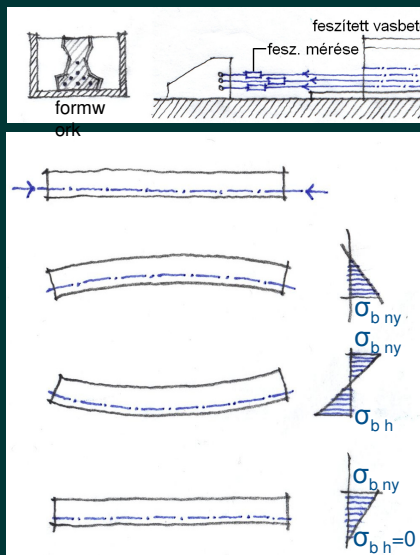
prefabricated beam floors

prefabricated floors - beam and hollow block floors - tensioned RC beam



prefabricated beam floors

prefabricated floors - beam and hollow block floors - tensioned RC beam



- concrete free of cracking
 - → longer lifespan
- disadvantages:**
- production requires skilled workforce and investment
 - expensive production

reaction to load: tension in the lower zone

combination of impacts: actually no tension in the concrete



the mechanism and effect of tensioning

prefabricated floors - beam and hollow block floors - tensioned RC beam



cross-section

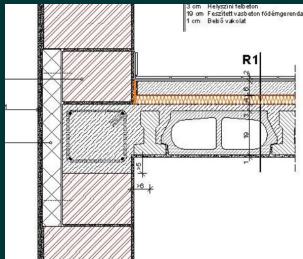
tensioned RC beam "E" e.g. E-36 = 3.60 m
2.40 - 6.60 m modular unit: 60 cm
filler blocks: spacing: 60 and 30, height: 19
cm, width: 60/19

concrete ceramic block wood-concrete block overlay!

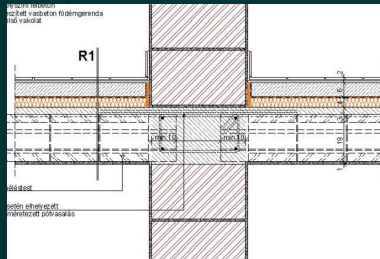


prefabricated beam floors

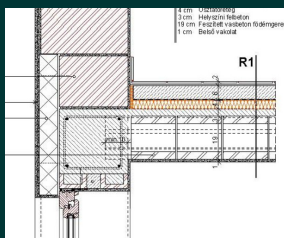
prefabricated floors - beam and filler block floors - tensioned RC beam



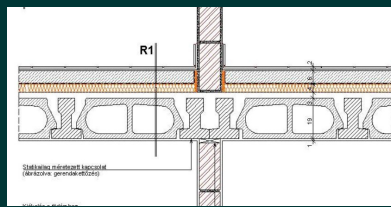
cross section of ring beam
perpendicular to the beam



intermediate load bearing wall, cross
section parallel to the beam



lintel cross section parallel to the beam



support of partition wall

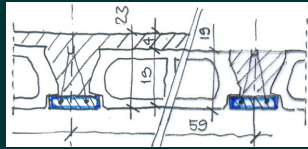


typical details of prefabricated RC beam floors

prefabricated floors - beam and hollow block floors - tensioned RC beam

partly-prefabricated beam and filler block floors

semi-monolithic: support and over lifting



„Master” floor: RC beam, concrete filler block
filler blocks: spacing: 59 (57.5) cm, height 19 cm
span: 1.20 - 8.90 m modular unit: 20 cm
 overlay concrete: 4-11 cm, with reinforcing mesh

over 6 m cross-rib is required, can also be installed as cantilever

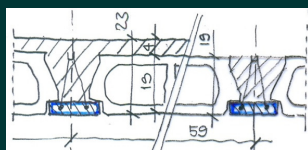


partly-prefabricated beam and filler block floors

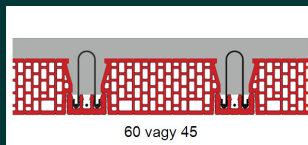
prefabricated floors - beam and filler block floors

semi-prefabricated beam and hollow block floors

semi-monolithic: support and overlifting



„Master” floor: RC beam, concrete filler block
filler blocks: spacing: 59 (57.5) cm, height 19 cm
span: 1.20 - 8.90 m modular unit: 20 cm
 overlay concrete: 4-11 cm, with reinforcing mesh



Porotherm precast concrete beam in ceramic shell
span: 2.25 - 7.0 m modular unit: 25 cm
filler blocks: spacing: 60 and 45 cm, height: 17 and 10 cm, sign: PTH 60/17, 45/10
 overlay concrete: 4-7 cm, with reinforcing mesh
 cross rib spacing max. 2 m, 2 pcs over 3.75 m, 3 pcs over 5.75

advantages: easy-to plaster, modular unit matching the walling block, easy-to-shape, flexible (reinforcement, lintels), easy installation of mechanical wiring and piping
Disadvantage: filler block may break during construction



filler blocks



semi-prefabricated beam and filler block floors

prefabricated floors - beam and filler block floors



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Porotherm floor

beam and filler block floors – semi-prefabricated floors



FERT floor

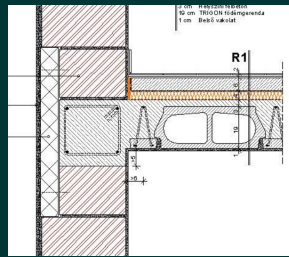


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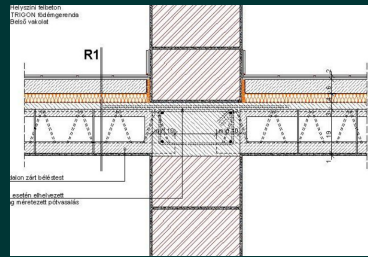


Porotherm and FERT floors

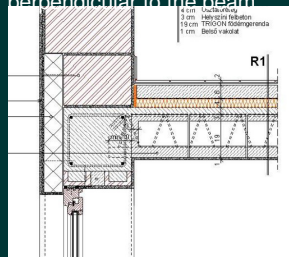
beam and filler block floors – semi-prefabricated floors



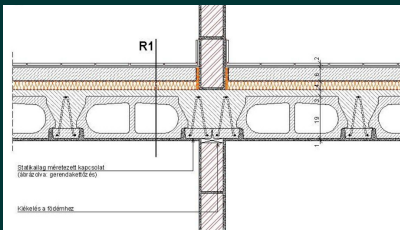
cross section of crown
perpendicular to the beam



middle bearing wall, cross section parallel
to the beam



lintel cross section parallel to the
beam



reinforcement under partition wall



typical details of semi-prefabricated RC beam floors
prefabricated floors - beams and filler blocks

Floor construction stages

1. transportation
2. temporary support installation
3. placement of beam units
(balconies, shafts, etc.)
4. surmounting (over-lifting)
5. filler blocks are put in (ceramic,
concrete etc.)
6. placement of steel upper
reinforcements (eg. steel mesh)
7. placement of beam connection
steel reinforcement
8. pouring of the concrete
9. after treatment
10. support removal



Porotherm and FERT floors
beam and filler block floors – semi-prefabricated floors

Main rules at arranging beam + filler block floor constructions

1. fulfill the average load bearing requirements (depending on the span)
2. beam must not be in the chimney wall
3. Minimum ring beam cross dimension 12 cm
4. support of special loads (For i. partition wall, monolithic area) → arrangement (double, triple beam)
5. cross ribs to avoid buckling + load transfer
6. changing of span
7. technology of balconies → **monolithic** (frost-resistance)
8. support of balconies → cantilever with thermal insulation → thermal break (see later)



Porotherm and FERT floors

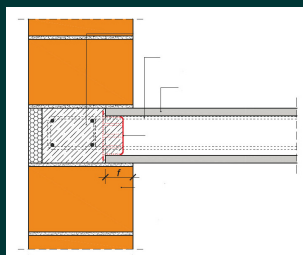
beam and filler block floors – semi-prefabricated floors

tensioned RC hollow-core floor slabs

height: 6; 20; 26.5; 32; 40; 45; 50 cm

span: 3.50 – 23.50 m (!!!)

width: 120 cm (60, 90)



ring beam section
parallel to the floor plank
axis - closure of circular
cavities

advantages:

- plaster-free surface
- large selection - slab thickness and load bearing capacity
- large spans as well
- fast construction
- can be used immediately

disadvantages:

- width is determined
- transport requires special machines



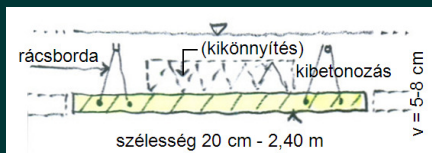
hollow-core floor slabs

prefabricated floors - plank floors

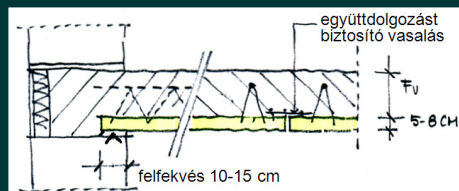


hollow-core floor slabs
prefabricated floors - plank floors

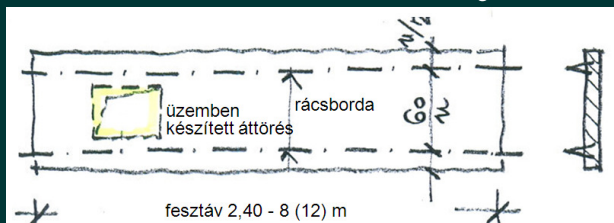
formwork panel slabs



slab thickness: 14-30 cm



ring beam detail and rotated section



panel top view and section

larger **openings** made in plant, on site max. 20x20 cm
computer-controlled production → actually any size and shape can be produced

advantages:

- plaster-free surface
- good sound insulation
- variable slab thickness and load bearing capacity
- wide range of sizes, unique forms
- easy installation of mechanical wiring and piping
- fast construction

formwork panels
prefabricated floors - plank floors