

BC4 Global Exam Topics

1. Foundations

- 1.1. **Basic principles of foundations; classification of shallow and deep foundations.** Fields of application, examples, typical features. Introduction of the construction principles of different deep foundations.
- 1.2. **Strip foundations:** fields of application, materials, typical constructions at different building methods. Minimal depth and width of strip foundations. Explanative sketches, details at buildings with or without basement or with floor level differences.
- 1.3. **Pad foundations and slab foundations:** fields of application, materials, typical constructions at different building methods. Connections of pad foundations to monolithic RC piers. Typical layer orders, details.

2. Protection of underground constructions against moisture exposures

- 2.1. **Underground moisture exposure types and protection possibilities.** Classification, basic principles of protection. Waterproofing materials, layers, thicknesses, auxiliary materials and counterstructures. Explanative sketches, typical layer orders.
- 2.2. **Protection possibilities against subsoil moisture exposures without hydrostatic pressure.** Waterproofing materials, layers, auxiliary structures at buildings with or without basement, at horizontal and inclined adjoining surface (lot grade). Protection against seepage flow.
- 2.3. **Protection possibilities against subsoil water exposure with hydrostatic pressure.** Materials, layers, auxiliary structures and counterstructures against uplift effect of the water pressure at basements with different depth of immerses.

3. Loadbearing walls, infill walls and partitions

- 3.1. **Masonry walls:** alternatives, structural solutions. Brickbond rules of traditional and up-to-date masonry walls. Ring beam and lintel alternatives. Explanative sketches, details.



- 3.2. **Building physics problems of external walls.** Thermal and hygrothermal behaviour of single shell and double shell walls; functions and materials of the individual layers of multi-layer constructions. Protection against external noise exposures. Complex building physics evaluation of different walling systems.
- 3.3. **Traditional masonry partition walls.** Walling block types, walling methods. Acoustic requirements and performance of internal walls. Flat separating and staircase wall structures and details. Plastered walls and walls without plastering. Lintel alternatives in partitions. Typical details.

4. Chimneys and ventilation

- 4.1. **Natural ventilation.** Operation principle and construction of different gravitational air exhaust and air supply systems. Explanative sketches, typical details.
- 4.2. **Chimneys.** Applications for open and for closed furnace boilers. sketches and typical cross sections, smoke flue vent connector details. Chimney cap details.

5. Floor slabs

- 5.1. **Monolithic reinforced concrete floor slabs.** Main types and constructions, fields of application and main features. Explanative sketches and typical structural details.
- 5.2. **Floor slabs with prefabricated and semi-prefabricated reinforced concrete beams.** Grouping of the structures, typical solutions, fields of application and features of the main structures. Explanative sketches and typical structural details.
- 5.3. **Prefabricated reinforced concrete panel (tensioned hollow core) floor slabs and formwork panel slabs (filigree reinforced concrete slabs).** Fields of application, typical structural solutions. Explanative sketches and typical structural details.

6. Stair constructions

- 6.1. **Doorsteps and internal stairs.** Doorstep alternatives. Staircase types taking into consideration the layout and the structure, the function and the demand of use. Explanative sketches and typical structural details.
- 6.2. **Monolithic reinforced concrete stairs.** Loadbearing alternatives, typical fields of application. Introduction of the turning edge construction at two and three

flights of stairs. Floor coverings, layers at staircases serving multiple functional units. Explanative sketches and typical structural details.

- 6.3. **Timber, steel, prefabricated reinforced concrete and composite stairs.** Fields of application, construction principles, structural solutions. Explanative sketches and typical structural details.

7. Pitched roofs, roof structures, roof claddings, attic extension

- 7.1. **Traditional rafter type and purlin type roof structures.** Classification, building width limits of field of application, typical structural member cross sections, bracing systems. Traditional and up-to-date timber joints. Fields of application, correlation between the roof structure type and the roof cladding.
- 7.2. **Engineered roof structures.** Prefabricated roof trusses and glued laminated timber supports. Engineered timber joints. Fields of application, structural details, connections. Explanative sketches and typical details.
- 7.3. **Traditional small scale roof claddings.** Roof covering principles and materials, application limits (roof pitch angle), supporting and fastening subsystems. Single layer and double layer cladding alternatives. Explanative sketches and typical details.
- 7.4. **Panel roof claddings.** Definitions, materials, supporting and fastening subsystems, watertight anchors. Explanative sketches and typical details.
- 7.5. **Metal roof claddings.** Materials, supporting and fastening subsystems. Connections of the metal strips and panels (seam alternatives) depending on the roof pitch angle. Structural possibilities of increasing of watertightness. Explanative sketches and typical details.
- 7.6. **Attic extension and their building physics characteristics.** Building construction and building physics characteristics of lightweight or dry boundary structures (inclined and horizontal boundary structures of attic extensions). Roles of air gaps, acoustic performance and hygrothermal behaviour of lightweight structures. Principal temperature gradient curves. Structural solutions, internal cladding alternatives. Explanative sketches and typical details.

8. Flat or low-slope roofs

- 8.1. **Basic principles of flat or low-slope roofs.** Classification, fields of application, construction features, building physics characteristics. Structural, building physics

and hygrothermal characteristics of different flat roofs; typical temperature gradient curves.

- 8.2. **Geometrical construction and water drain types of flat roofs.** Classification of inclination layers, applicable minimal inclinations. Exposure classification of waterproofings, basic rules of waterproofing selection. Fixation alternatives against wind suction.
- 8.1. **Waterproofing materials of flat roofs.** Introduction of the different waterproofing materials and their most important features, layer orders, typical fastening and overlapping technologies. Explanative sketches and typical details (parapet wall, gully).
- 8.2. **Tracking type (accessible) roofs, green roofs.** Basic design principles, building physics characteristics, main technical features. Typical layer orders, constructions. Explanative sketches and typical details (parapet wall, gully).

9. Facade claddings

- 9.1. **Basic principles of façade cladding design.** Materials, building physics characteristics (thermal and hygroscopic behaviour, acoustics). Classifications based on the materials and the structural solutions. Coordination possibilities between the thermal insulation and the façade doors and windows.
- 9.2. **Heavyweight façade claddings.** Classification, materials, structural solutions, fastening alternatives. Building physics characteristics. Fields of application, typical details.
- 9.3. **Lightweight façade claddings.** Classification, materials, structural solutions, fastening alternatives. Building physics characteristics. Fields of application, typical details.

10. Doors, windows, gates

- 10. 1. **Internal doors.** Requirements, performance classifications. Frame and door leaf alternatives, fixation of the frame to masonry and lightweight internal walls. Finishing alternatives: in situ, factory finish. Special operation modes and fields of application. Explanative sketches and typical details.
- 10.2. **Internal and external entrance doors.** Requirements, performance classifications. Structure, operation modes, fixation alternatives to the walls, connection to the waterproofing. Explanative sketches and typical details.

- 10.3. **Up-to-date windows with triple glazing.** Typical constructions, materials. Features of the thermally insulated glass products, acoustic performances. Explanative sketches and typical details with traditional single-shell walls and multi-layer structures. Auxiliary structures of windows.
- 10.4. **Gates.** Operation modes and constructions, solutions depending on the function, size, material. Garage doors, industrial gates. Explanative sketches, fixation alternatives, typical details.
- 10.5. **Shading systems, shuttering, anti-burglary grills.** Fields of application, structural features. Explanative sketches and typical details.

11. Suspended ceilings

- 11.1. **Suspended ceilings.** Classifications, functions, materials, structural alternatives. Introduction a homogenous, a baffle type and a grid and tile type suspended ceiling with explanative sketches and typical details.

12. Floor structures, floor coverings

- 12.1. **Floor structures.** Layer orders and floor covering classifications. Fields of application, classification and evaluation based on the acoustic performance and thermal behaviour. Comparison of traditional and up-to-date structures. Floor structures over intermediate floor slabs and laying on the ground. Position of building service pipes and electric cables in the floor structures.
- 12.2. **Cold and warm floorings.** Classification based on the heat absorption characteristics, materials, dimensions of the flooring material. Fixation possibilities, transition (levelling) profiles, wall joints, expansion joint alternatives and details.
- 12.3. **Special floor structures.** Double floor, raised floor, sport floors, underheated floor, colt storage floor structures. Layer orders, typical details.

13. Indoor waterproofings

- 13.1. **Indoor waterproofings.** Classification of the requirements based on the exposure (performance-based design). Structural requirements and exposure grades. Main construction rules, typical materials and layer orders.