

CONCRETE MIX DESIGN

CT1

BI02 Testing and Technology

Name and last name::

Institute of Technology of Building Materials
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Study group:

Date:

1. INPUT PARAMETERS [EN 206-1, Z3]

Create concrete mix design for strength grade C _____

Requirements according to standard: EN 206-1

Minimal strength grade: C _____

Min. cement amount: $m_c =$ _____ kg/m^3

Max. water cement ratio: $W =$ _____

Other requirements and parameters:

Required consistency/workability: Slump test - S3 acc. EN 12350-2

Air amount in fresh concrete: 2%

Cement used: CEM II/B-S 32,5 R, production plant: Mokr, CZ

Aggregates:

Fine quarried 0-4 mm, abice
Coarse crashed 4-8 mm, eleice
Coarse crashed 8-16 mm, eleice

Admixture: plasticizer – Mapelast N10, dosage 1% of m_c

Water: tap water

2. CALCULATION OF AGGREGATE MIXTURE

Calculate oversize for mesh sizes from table 1. Enter results into table 2

Table 1: Grain size distribution analysis - partial oversize (rests) for each mesh in kg

Mesh size [mm]	Partial oversize		
	abice 0-4 mm [kg]	eleice 4-8 mm [kg]	eleice 8-16 mm [kg]
63	0,0	0,0	0,0
32	0,0	0,0	0,0
16	0,0	0,0	0,0
8	0,0	0,0759	1,706
4	0,0530	0,6288	0,180
2	0,1821	0,2220	0,074
1	0,1415	0,0438	0,0
0,5	0,2941	0,0157	0,0
0,25	0,2352	0,0046	0,0
0,125	0,0859	0,0041	0,01
0,063	0,0064	0,0040	0,01
0	0,0019	0,0016	0,02
Check	1,0001	0,9992	2,000

Table 1: Grain size distribution analysis - partial oversize (rests) for each mesh in %

Mesh size [mm]	Partial oversize		
	Žabčice 0-4 mm	Želešice 4-8 mm	Želešice 8-16 mm
	[%]	[%]	[%]
63	0	0	0
32	0	0	0
16	0	0	0
8	0	7,5	85,3
4	5,3	62,9	9
2	18,2	22,2	3,7
1	14,2	4,4	0
0,5	29,4	1,5	0
0,25	23,5	0,5	0
0,125	8,6	0,4	0,5
0,063	0,6	0,4	0,5
0	0,2	0,2	1
Check	100	100	100

Grain size distribution curve is designed according to: Fuller Formulae:

$$y = \left(\frac{d}{D_{\max}} \right)^n \cdot 100[\%]$$

Parameters of final aggregate mixture

0-4 mm , Žabčice - 42,8 %

4-8 mm , Želešice - 28,3 %

8-16 mm , Želešice - 28,9 %

4. WATER AMOUNT CALCULATION

Deduce water amount from table and according to grain size curve and required consistency.

Proposed water amount $m_w =$ kg/m³

5. CEMENT CONTENT CALCULATION

Calculate cement amount from max. water cement ratio according to EN 206-1.

Water cement ratio value from EN 206-1: $W =$

Water cement ratio formulae: $W =$

Cement content: $m_c =$ = kg/m³

6. CALCULATION OF AGGREGATE AMOUNT

Calculate it from EAV

$m_A =$ kg/m³

Division of calculated aggregates into fractions:

0-4 mm , Žabčice - <u>42,8</u> %	kg
4-8 mm , Želešice - <u>28,3</u> %	kg
8-16 mm , Želešice - <u>28,9</u> %	kg

6. CONCRETE COMPOSITION

Concrete C _____

Aggregates m_A : _____ kg/m^3

0-4 mm Žabčice _____ kg/m^3

4-8 mm Želešice _____ kg/m^3

8-16 mm Želešice _____ kg/m^3

Cement content m_c : _____ kg/m^3

Admixture content m_{AD} : _____ kg/m^3

Water amount m_w : _____ kg/m^3

Design bulk density of fresh concrete mixture: $D =$ _____ kg/m^3

7. CONCLUSION