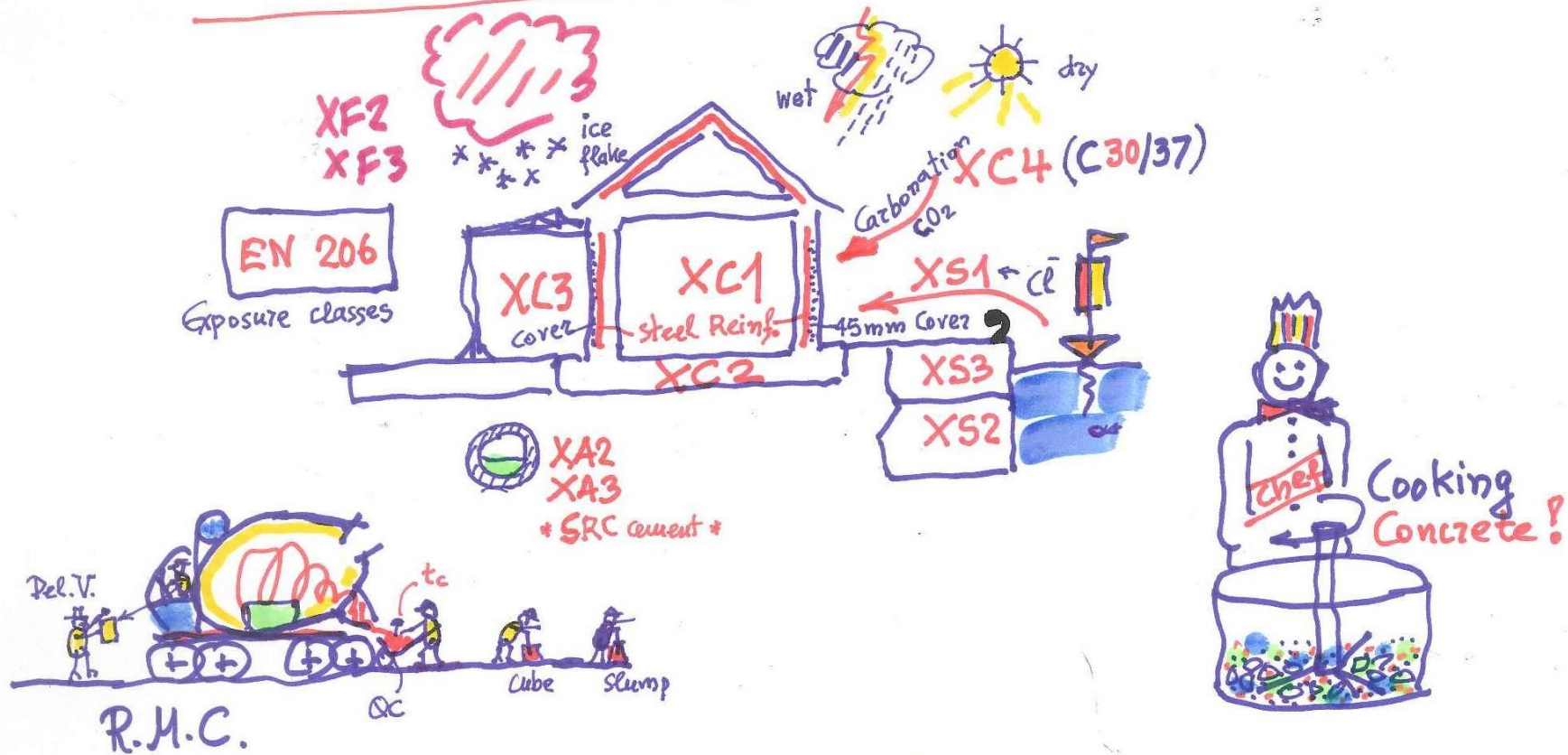


"EN 206: The European Standard for RMC"

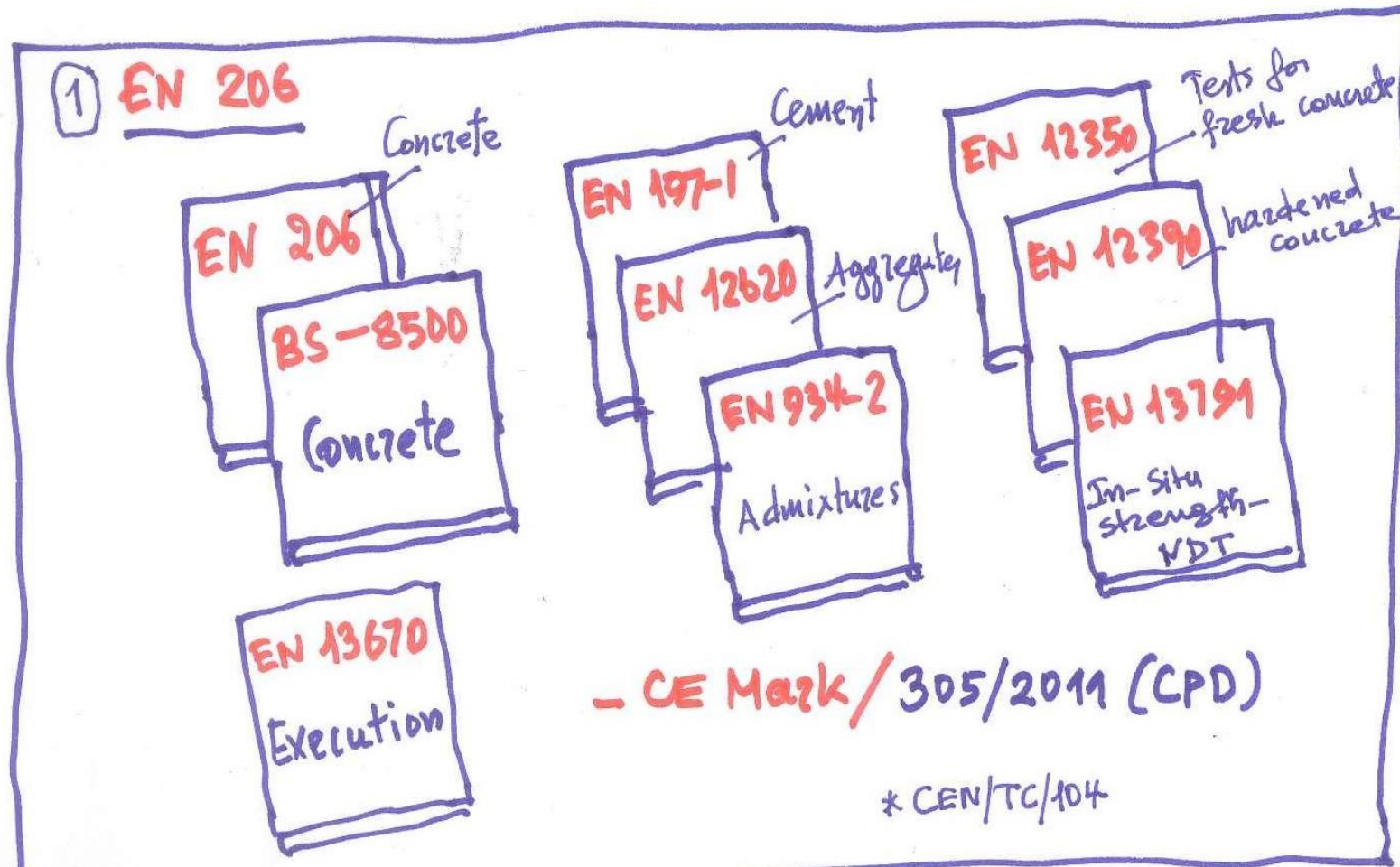


Nikolaos Marsellos
Civil Engineer, NTUA

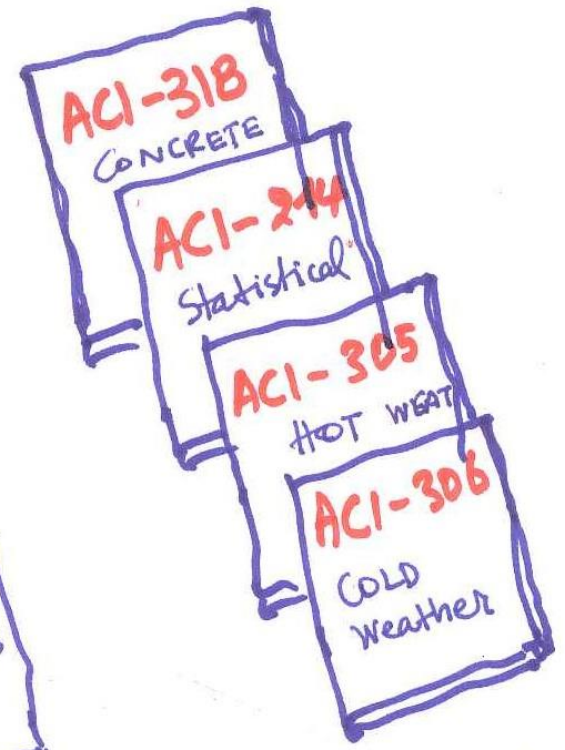
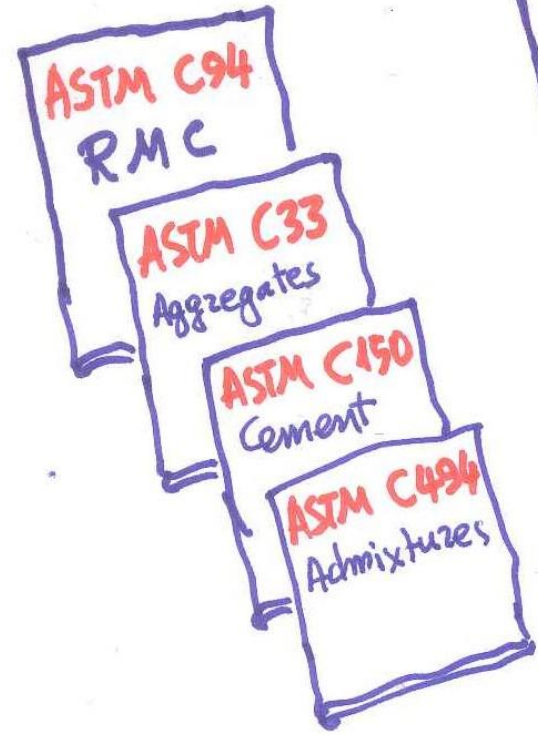
NM/8.4.2021



EN 206: European Standard for RMC



2 ASTM, ACI

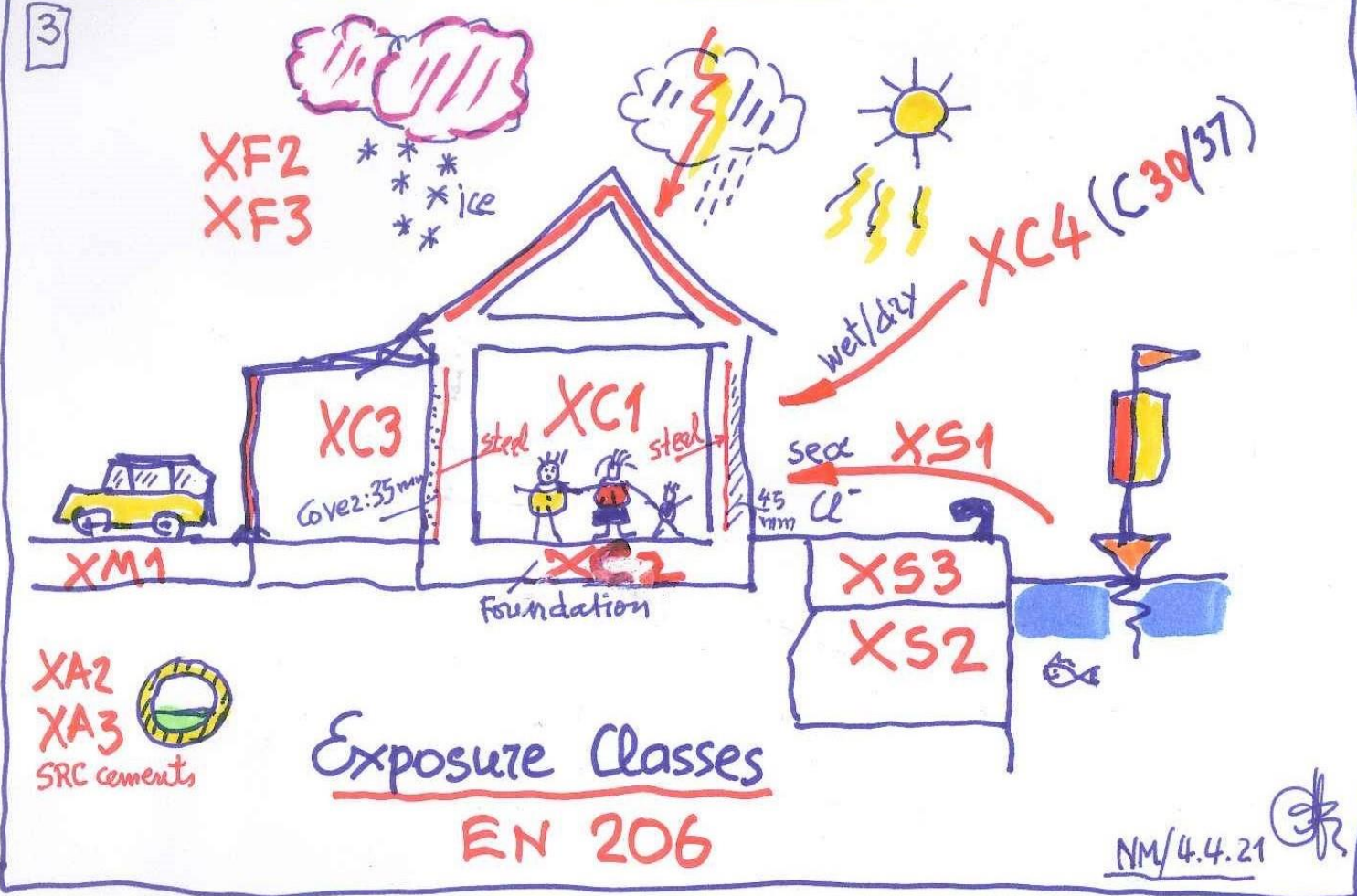


* www.concrete.org

NM/30,3,21




3



XA2
XA3
SRC cements



Exposure Classes
EN 206

NM/4.4.21 



4

	Carbonation			Chlorides	
	XC2	XC3	XC4	Cem II *	Cem I *
				XS1	XS1
W/C	0,60	0,55	0,50	0,50	0,50
Class (MPa)	C25/30	C25/30	C30/37	C25/30	C30/37
Min Cem (kg/m ³)	300	300	320*	330	330
Cover* (mm)	25	35	35	45	40

*1,5 km
from sea

EN 206: Limiting Values

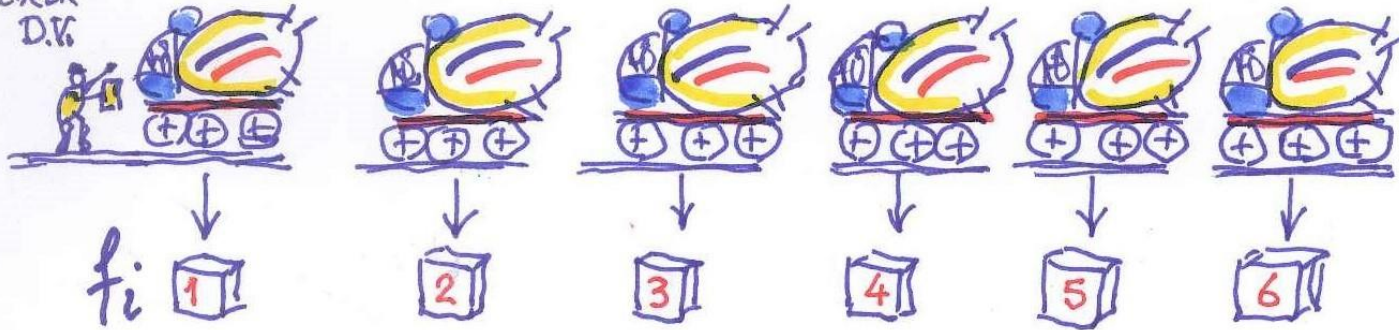
* Greek: C.T.R.-2016

DM/4.4.2021



5

Acceptance of RMC

Check
D.V.

$$\left\{ \begin{array}{l} \bar{f}_6 \geq f_{ck} + 1,60 \times S \\ f_i \geq f_{ck} - 2,0 \text{ MPa} \end{array} \right\} , \min S \geq 1,5 \text{ MPa}$$

Compliance criteria

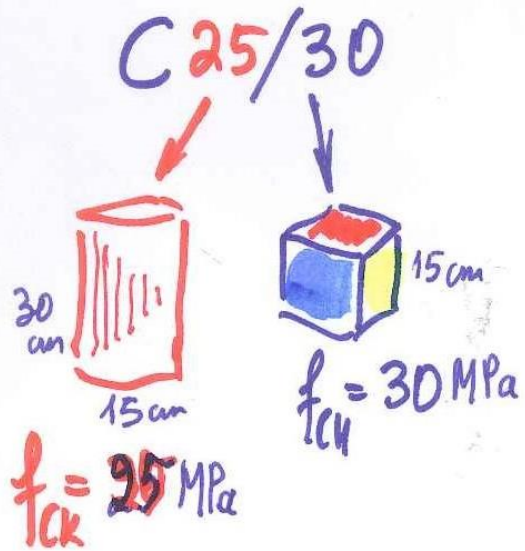
- 6 cubes/per 150m³

NM/4.4.2024

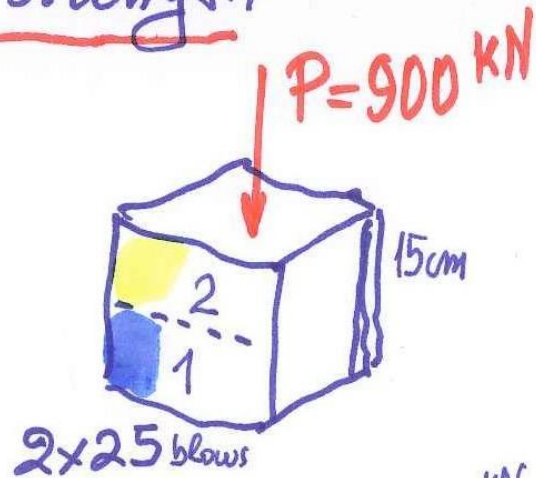


6

Compressive Strength



f_{ck} = characteristic strength (5%)



$$\sigma = \frac{P}{F} = \frac{900 \text{ kN}}{225 \text{ cm}^2} = 40 \text{ MPa}$$

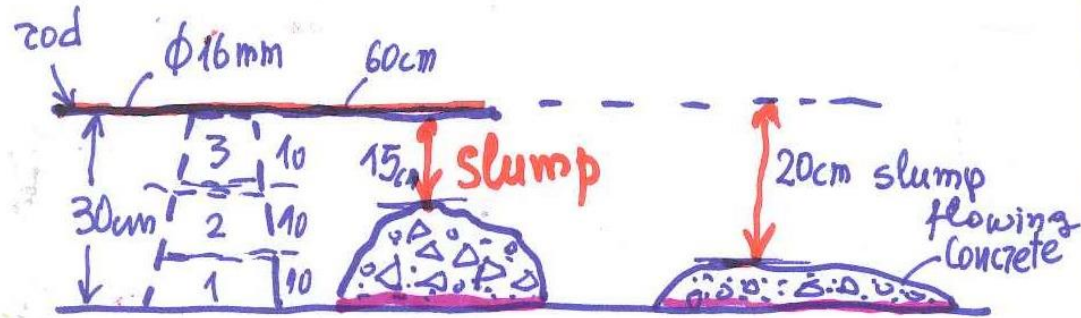
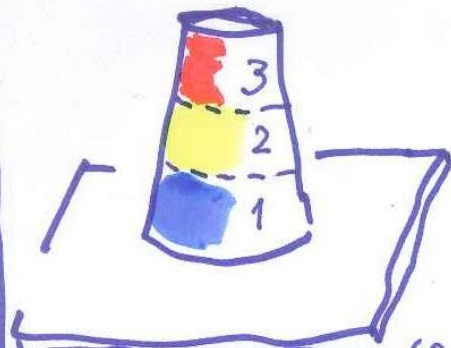
EN 12390
ASTM C31

N.M./4.4.2021



7

Workability of concrete



dia = 16mm 60cm

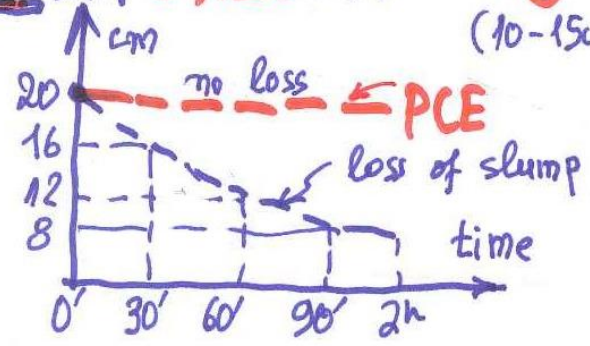
3x25 bars

S3
(10-15cm)

S4
(16-21cm)

EN 12350

Slump test



* Also: Slump Flow > 60-85 cm
Vebe, etc

H.M./4.4.2021

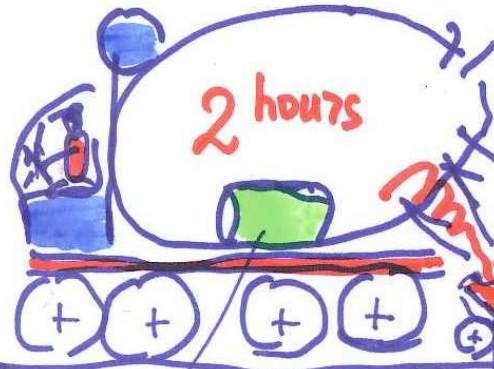




Quality Control : QC

Check the Delivery Voucher

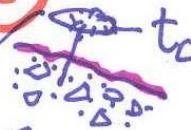
1



2 hours

winter $10^{\circ}\text{C} < t_c < 32^{\circ}\text{C}$ Summer

5



3



2

Sample 20-25 et

4

Cube Slump

Delivery Voucher



Admixtures

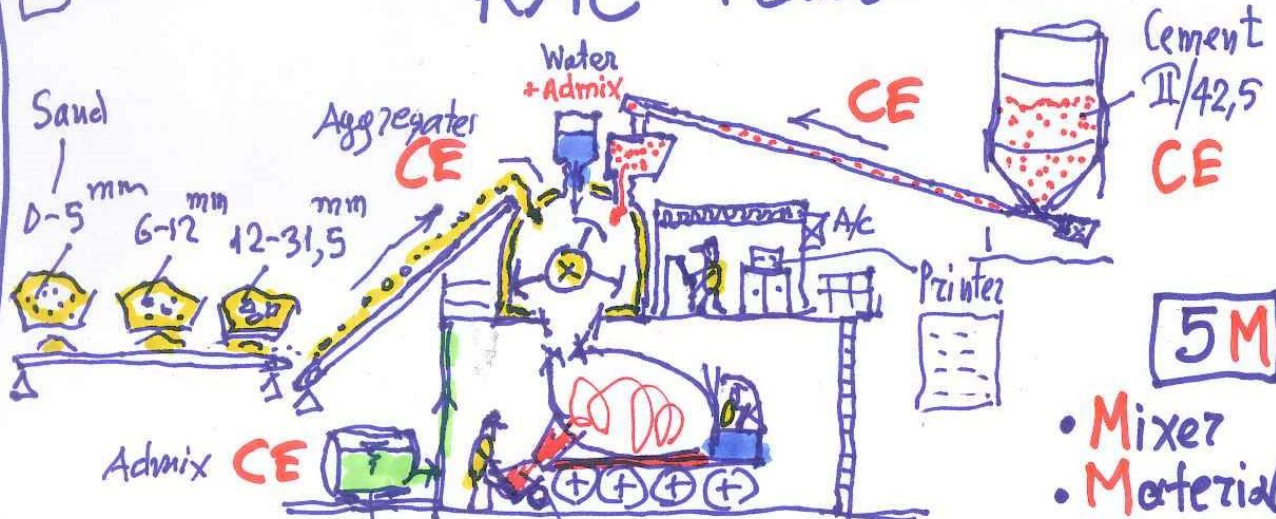
- EN 206-2013
- ASTM C94-97 (1.5 hours)
- IS 4926-2003 (2.0h)
- Greek CTR-2016 (2.0h)

NM/4.4.2021



9

RMC Plant



5M

- Mixer
- Materials Eng.
- Mix Design
- Min Cement
- Max W/C ratio



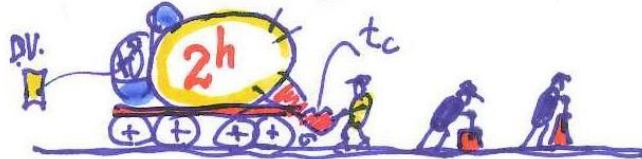
- EN934-2 QC
- EN 206
 - ASTM C94
 - Greek CTR-2016
 - CE Marking

nik. Marsellos / 4.4.2021



10

Conclusions

- Existing Standards: EN 206, EN 12350, EN 12390
EN 13791
- Correct Ordering: Exposure Class, i.e. XC4, XS1, etc
: Slump Class, i.e. S3, S4, etc
- Accepting Concrete: QC 
- Compliance Criteria: $f_b \geq f_{ck} + 1,60 \cdot S$, $f_i \geq f_{ch} - 2 \text{ MPa}$
- Use PCE Admixtures = no loss-of-slump
No added Water



Thank you!

Nikolaos Marsellos/4.4.2021



THANK YOU

