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Continuing Education Course #416
Concrete Slabs-on-Grade
Warehouses III – High Performance Slabs

1. Choose the best answer: Type K, M, or S cements in shrinkage compensating concrete promote the _____ of concrete.
 - a. shrinkage
 - b. ductility
 - c. expansion
2. Choose the best answer: Sulfates in the cement are required in carefully calibrated amounts to allow for the formation of _____, which is a mineral produced to cause expansion.
 - a. aluminum zirconium tetrahydrochlorox gly
 - b. ettringite
 - c. ammonium laureth sulfate
3. When the amount of expansion equals or exceeds the amount of drying shrinkage, this is known as _____ shrinkage compensation.
 - a. insufficient
 - b. partial
 - c. full
4. The use of shrink comp concrete in slabs means that the normal use of _____ to introduce controlled straightline cracks to relieve tension is no longer necessary.
 - a. control joints
 - b. random cracks
 - c. forklift traffic
5. In general, is extremely important to _____ while curing shrink comp slabs.
 - a. restrain the slab from moving using obstructions
 - b. allow the slab to move
 - c. force the slab to dry out quickly
6. The construction of shrinkage compensating concrete slabs is generally performed by _____ contractors.
 - a. undiscerning
 - b. inexperienced
 - c. specialty
7. Choose the best answer: Fibers allow for enhanced _____ of a concrete slab.
 - a. expansion
 - b. post-crack residual strength
 - c. workability
8. Typical synthetic fiber dosages are as follows for the crack control of concrete.

- a. 0.5 to 1.0 lbs / cu. yd.
 - b. 3.0 to 7.5 lbs / cu. yd.
 - c. 15.0 to 25.0 lbs / cu. yd.
9. If ductility is sufficient, _____ theory (and related equations) would be an advantage in strength checks.
- a. superstring
 - b. yield line
 - c. relativistic
10. Macrofibers appear to induce _____ that are spread out over the area of slab, relieving stresses more often, and reducing the chances of random cracking (Choose the best answer):
- a. wide cracks
 - b. highly visible cracks
 - c. microcracks
11. Reinforcing in a concrete slab is recommended if _____ :
- a. joint spacing is wider than ACI 360 recommendations
 - b. shrinkage is 0.02% or less
 - c. joint spacing is less than 12 feet on center in each direction
12. When a slab has 0.5% or greater steel reinforcing by area, this is known as _____ reinforcing.
- a. intermittent
 - b. fiber
 - c. continuous
13. The crack sizes to expect for pours with 0.6% continuous reinforcing is in the range of ____, or the thickness of a credit card.
- a. 0.03"
 - b. 0.25"
 - c. 1.0"
14. Slabs containing steel tendons or cables that are pulled with jacks after the slabs-on-grade are poured are called _____ slabs-on-grade.
- a. unreinforced
 - b. post-tensioned
 - c. high shrinkage
15. The practical limit for the size of single poured area with post-tensioning is about _____ feet in each direction.
- a. 25
 - b. 50
 - c. 200
16. _____ tendons are housed in plastic sleeves with grease reducing the friction between the sleeve and tendon
- a. Unbonded
 - b. Bonded
17. Tendon pulling in post-tensioned slabs should occur as _____ as possible to keep the slab from cracking during the drying shrinkage stage.
- a. late
 - b. early

18. Creep, drying shrinkage, relaxation of the PT tendons, and elastic shortening of the concrete under stress are all examples of _____ losses.

- a. long term
- b. short term

19. Choose the best answer: Warehouses with temperatures in the -15F to 0F range need to be reviewed for potential _____ lenses that can penetrate into the soil matrix:

- a. frost
- b. shrinkage
- c. reinforcing

20. The use of _____ in flexible tubing to prevent a frozen soil matrix is fairly common.

- a. cool compressed air
- b. warm glycol fluid
- c. 14 degree F ethyl alcohol

21. The draw down temperature sequence for a freezer slab with a final operating temperature of -15F begins with dropping the temperature to _____ on the initial draw down.

- a. +35F
- b. -15F

22. Automated Storage & Retrieval System racking (ASRS) systems, use _____ to move products to and from the racking.

- a. manual methods by hand
- b. crane-type lifts
- c. conventional worker-driven forklifts

23. Installation of the automated equipment in ASRS racking systems may require that FEM Specifications _____ needed to be met.

- a. 360
- b. 9.831 and 9.832
- c. 318-14

24. One rack system requiring a superflat floor is _____ racking

- a. short wide-aisle
- b. Very narrow aisle (VNA)

25. For a VNA system, the lifts need to travel in superflat aisles on what is known as " _____-traffic floors."

- a. defined
- b. undefined
- c. random

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