MASTER® BUILDERS SOLUTIONS

Admixtures 101

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A brand of MBCC GROUP

Admixtures

A material other than water, aggregates, hydraulic cement, and fiber reinforcement, used as an ingredient of concrete or mortar, and added to the batch immediately before or during its mixing. (ACI 116R - Terminology

Why use Chemical Admixtures?

- Increase strength
- Economics
- Increase workability / Ease of placement
- Improve finish
- Enhanced aesthetics
- Better mechanical properties
- Improved durability
- Increased service life
- Sustainability

Benefits of Chemical Admixtures in Fresh Conrete

- Decrease water content
- Increase workability
- Retard or accelerate time of set
- Entrain air
- Reduce segregation
- Reduce rate of slump loss
- Improve pumpability, placeability, finishability

Benefits of Chemical Admixures in Hardened Concrete

- Increase strength
- Increase durability
- Improve aesthetics

Main Classes of Chemical Admixtures

- Water Reducers
  - Normal
  - Mid-Range
  - High-Range
- Set Control
  - Accelerators
  - Retarders
- Durability Enhancing
  - Air-entrainers
  - Corrosion inhibitors
  - Shrinkage reducers
  - Crack reducers
  - ASR inhibitors
- Other
  - Viscosity modifiers
  - Rheology control

ASTM C 494 Admixture Classifications

- Type A — Water-Reducing
- Type B — Retarding
- Type C — Accelerating
- Type D — Water-Reducing & Retarding
- Type E — Water-Reducing & Accelerating
- Type F — Water-Reducing, High-Range
- Type G — Water-Reducing, High-Range & Retarding
- Type S — Specific Performance Admixture

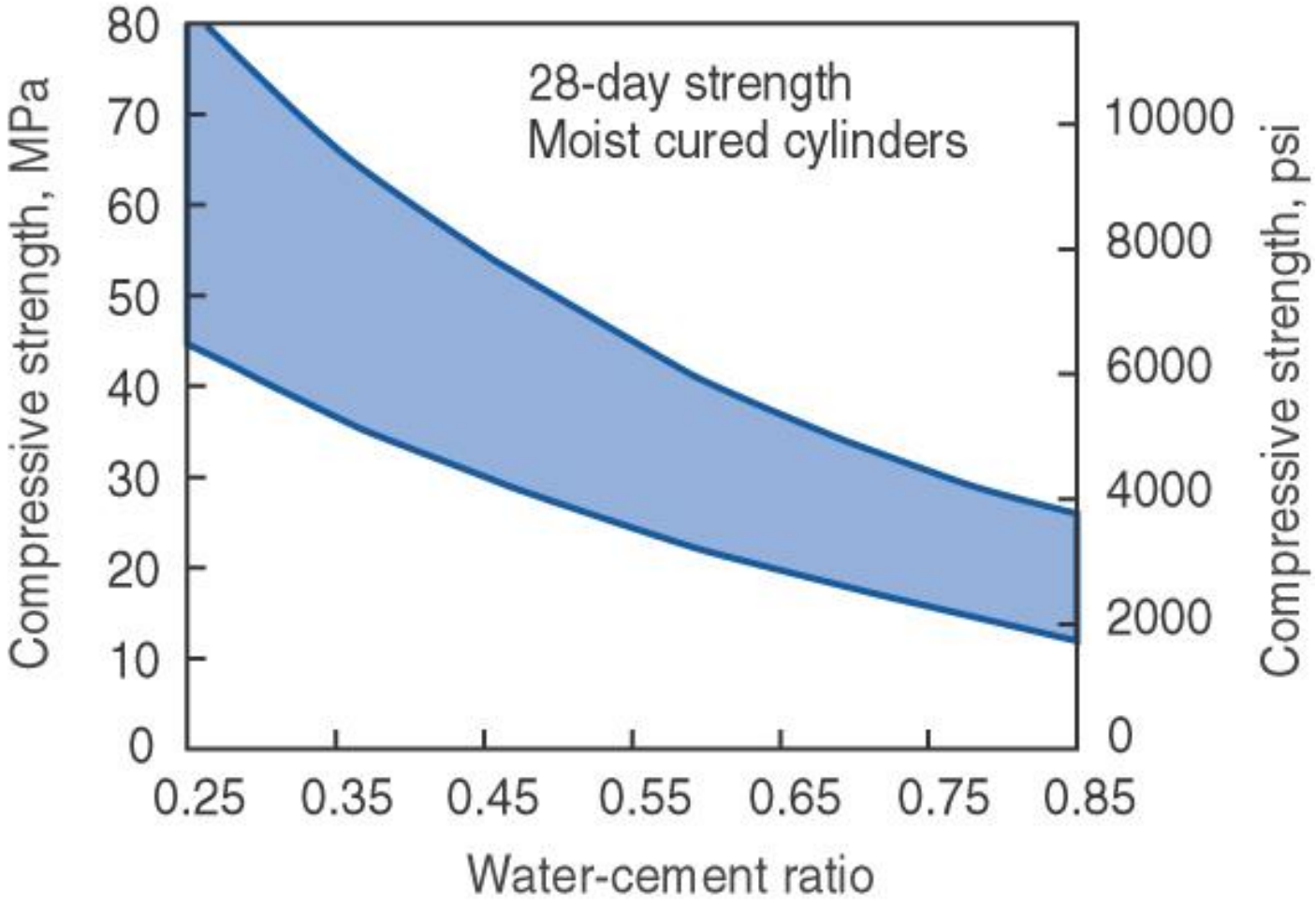
Core Chemical Admixtures

- Air-entraining
- Water-reducing
- High-range water-reducing
- Retarding
- Accelerating
- Intregral Water Proofing
- Fiber

About Concrete

- Specifications
  - Usuall specified by strength, minimum cement content or w/c
  - w/c = water to cement ratio (mass of water/mass of cement)
  - w/cm = water to cementitious materials (cement + fly ash, slag, etc.)
- Guidelines
  - Residential: 4,000 psi
  - Light Commercial: 4,000 to 6,000 psi
  - Commercial: 5,000 to 10,000 psi
  - Infrastructure (DOT): 5,000 to 8,000 psi

Typical Relationship of Strength to w/c



Why use Air-Entrainment

Primarily to protect against freezing and thawing cycles and scaling surfaces.

Water Reducing Admixtures

Conventional

Mid-Range

High-Range

Water Reducing Admixtures

Either:

Increase slump of freshly-mixed mortar or concrete without increasing water content

Or:

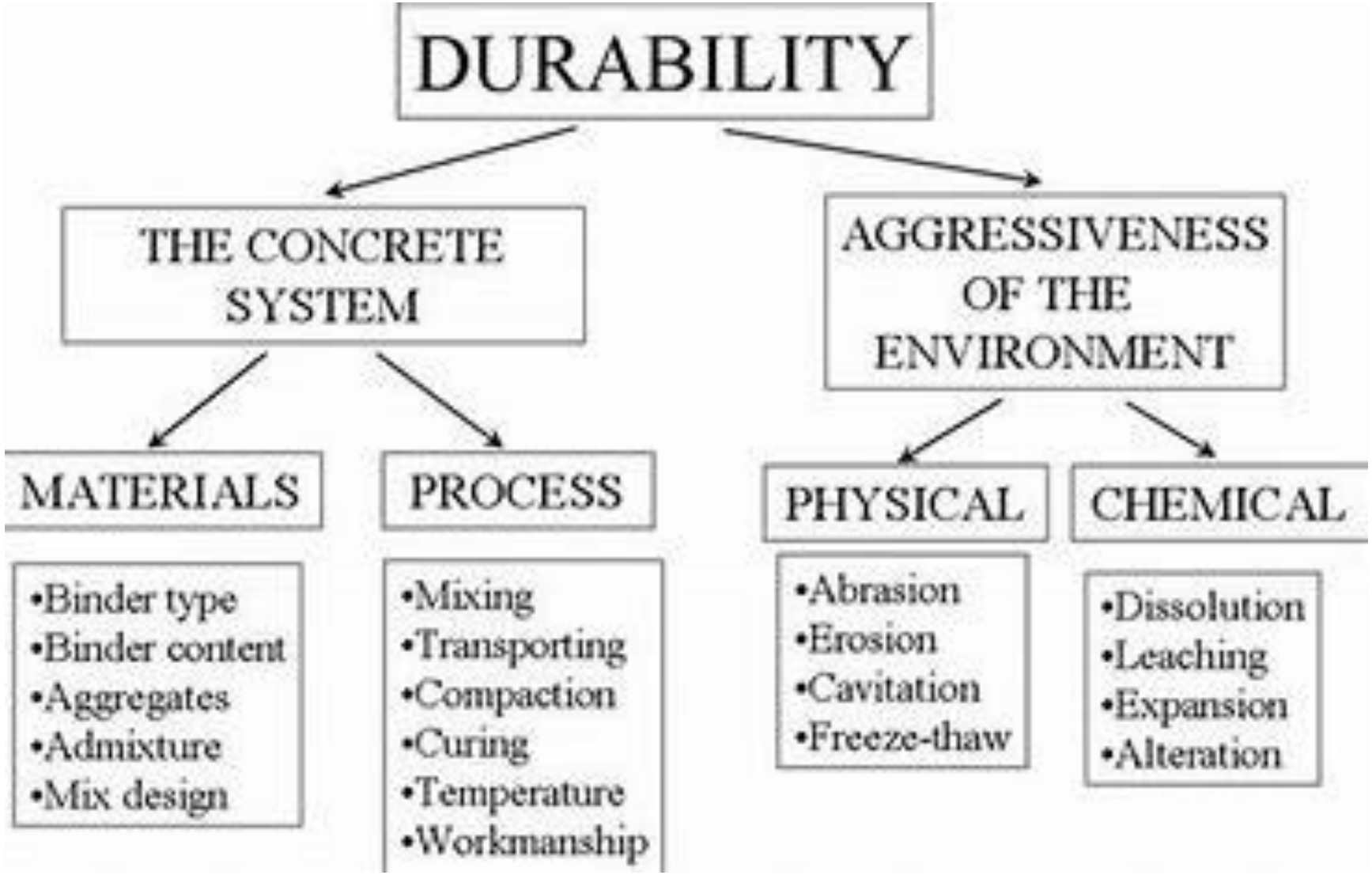
Maintain slump with a reduced amount of water, the effect being due to factores other than air entrainment.

Accelerator Benefits

- Allow for faster turnover of forms
- Early stripping breaks 16-18hr
- Enhances early strength development 24hr – 7 Day
- Acclerates production schedules

Retarding Benefits

Retarding admixutes cause a decrease in the rate of hydration of hydrualic cement and lengthen the setting time of concrete. Retarders are used to offset the effect of high temerature and improve the workability of concrete in warmer temperatures. Benefits fo retarders include reduced cold joints and better finish in hot weather.


DURABILITY
THE CONCRETE SYSTEM
AGGRESSIVENESS OF THE ENVIRONMENT
MATERIALS
PROCESS
PHYSICAL
CHEMICAL
•Binder type
•Binder content
•Aggregates
•Admixture
•Mix design
•Mixing
•Transporting
•Compaction
•Curing
•Temperature
•Workmanship
•Abrasion
•Erosion
•Cavitation
•Freeze-thaw
•Dissolution
•Leaching
•Expansion
•Alteration

Specialty Applications

- Corrosion Protection
- Fiber Reinforcing
- Crystalline Waterproofing
- Antimicrobial Protection
- SCC in precast

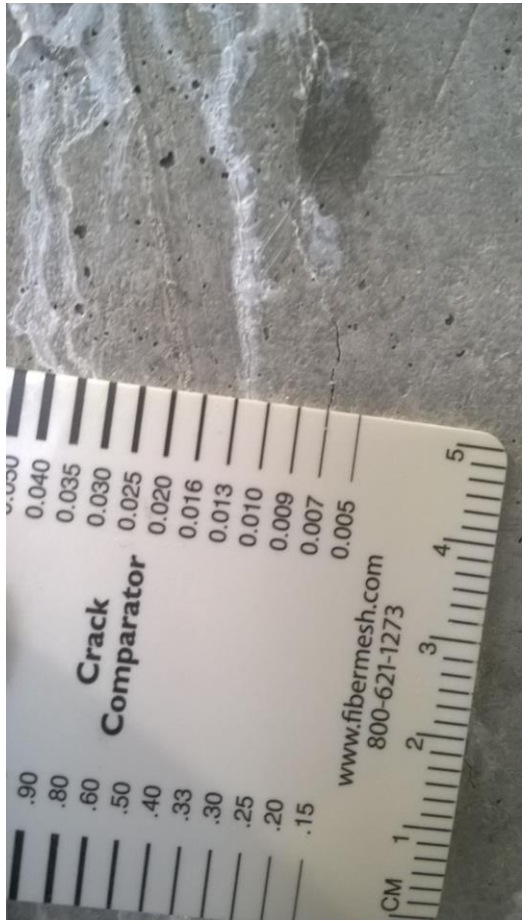
Corrosion Inhibitor Applications

- Steel Reinforcement Protection
- Exposed to chloride environment

Fiber Reinforcement

- Level 1: Plastic shrinkage reinforcement
  - Monofilament
- Level 2: Temperature shrinkage reinforcement
  - Fibrilated
- Level 3: Post first crack reiforcement
  - Macro synthetic
  - Able to carry load after first crack
- Level 4: Replacing structural or primary reinforcement steel

Crystalline Waterproofing Admixtures



Admixtures...

Just do their job.

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