5 ADMIXTURES

5.1 GENERAL

5.1.1 Scope

1 This Part includes materials added to the concrete materials during mixing.

2 Related Sections and Parts are as follows:

This Section
Part 1 ..... General
Part 6 ..... Property Requirements
Part 7 ..... Concrete Plants
Part 16 ..... Miscellaneous

5.1.2 References

1 The following standards and other documents are referred to in this Part:

ACI 212.3R-10 ..... Report on Chemical Admixtures for Concrete

ACI 302 ..... Guide for Concrete Floor and Slab Construction

ACI 305 ..... Hot Weather Concreting

ACI 308 ..... Standard Practice for Curing Concrete

ASTM C494,..... Standard Specification for Chemical Admixtures for Concrete

ASTM C979 / C979M Standard Specification for Pigments for Integrally Colored Concrete

ASTM C1582,..... Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete

EN 934 ..... Admixtures for concrete, mortar and grout (Parts: 2, 6)

EN 196, ... Methods of testing cement

EN 12878 ..... Pigments for the colouring of building materials based on cement and/or lime. Specifications and methods of test

EN 14889 ..... Fibres for concrete Polymer fibres. Definitions, specifications and conformity

NSF..... Standard 61

5.1.3 Definitions

1 Admixtures are materials added during the mixing process of concrete to modify the properties of the concrete mix in the fresh and/or hardened state.

5.1.4 Submittals

1 In addition to the specified general requirements for approval of materials, approval of admixtures shall be subject to extensive trials to demonstrate the suitability, adequacy of dosing arrangements and performance.

5.2 USE OF ADMIXTURES

5.2.1 General

1 Admixtures are materials added to the concrete materials during the mixing process to modify its properties in the fresh and/or hardened state.

2 Where approved and or directed by the Engineer, admixtures shall be used as a means of:

(a) enhancing concrete durability

(b) increasing workability of the concrete without increasing the water:cement ratio

(c) controlling retardation and setting time.

3 Admixtures shall comply with the following EN 934 – 2 requirements or the equivalent ASTM C494:

(a) water reducing/plasicizing admixture

(b) high range water reducing/plasticizer admixture

(c) set retarding admixtures

4 The methods and the quantities of admixture used shall be in accordance with the manufacturer's instruction and subject to the Engineer's approval after evaluation in trial mixes and shall in no way limit the Contractor's obligations under the Contract to produce concrete with the specified strength, workability and durability.

5 The effects of accidental overdose of the admixture and measure to be taken if an overdose occurs shall be provided by the Contractor to the Engineer.

6 No admixtures containing chlorides shall be used. In particular, the use of acceleration admixtures containing calcium chloride shall not be used.

7 The use of the admixtures shall be controlled; i.e., strict quality control to ensure correct dosages as prescribed by the manufacturer and justified by trial mixes to be used. A calibrated dispenser or flowmeter shall be used for the addition of the admixture.

5.2.2 Trials

1 In addition to the standard requirements for the approval of materials, approval of admixtures shall be subject to extensive trials to demonstrate the suitability, adequacy of dosing arrangements and performance, when a proven history of performance cannot be provided to the satisfaction of the Engineer.

5.3 WATER PROOFING ADMIXTURES

5.3.1 General

1 The admixture shall be suitable for use in the Gulf condition, and specially formulated for higher ambient temperature.

2 The admixture shall be added as per manufacturer's datasheet. Approved third party laboratory verification shall be conducted prior to use of material for the works. The manufacturer's technical representative shall be present to ensure proper dosage of admixture during the trial mix.

5.3.2 Water resisting admixtures

1 Water resisting admixtures may be used with the permission of the Engineer and shall comply with the requirements of EN 934-2.

2 The admixture is to be added as per the Manufacturer's supplier data sheet at the time of mixing. An approved lab verification shall be made prior to use,

5.3.3 Permeability reducing admixture

1 The admixture shall be a permeability reducing admixture for Non-Hydrostatic Conditions (PRAN) and a permeability reducing and self-sealing admixture for hydrostatic conditions (PRAH) as indicated by ACI 212.3R-10, or crystalline waterproofing admixture.

2 For PRAH, independent testing shall be performed according to NSF Standard 61 and approval for use of waterproofing material on structures holding potable water shall be evidenced by NSF certification.

5.3.4 Submittals

1 The Contractor shall submit manufacturers' specifications, installation instructions and other data to show compliance with the requirements of this part of the specification and the Contract Documents.

2 The Contractor shall submit comprehensive test results for the water proofing admixture as per the tests in the specification, and evidence of their ability to meet all the requirements specified.

3 The Contractor shall submit a guarantee for the water proofing admixture. The guarantee shall be worded to reflect the required performance of the material and shall be approved by the Engineer.

4 CORROSION INHIBITING ADMIXTURES

5.3.5 General

1 Where reinforced concrete structures are exposed to aggressive environment such as underground and marine structures, the use of a corrosion inhibiting admixture shall be used.

2 Corrosion Inhibiting Admixtures shall comply with ASTM C1582 Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete.

5.3.6 Organic Corrosion Inhibitors

1 The admixture shall be based on either aqueous emulsion of amines and esters or amine carboxylates and shall be capable of forming a protective corrosion resistant film around the steel reinforcement.

2 The corrosion inhibitor shall be capable of effecting protection to the steel where concrete has cracked and allows access to the elements responsible for corrosion.

3 Organic corrosion inhibitors have a fixed dosage rate independent of chloride levels and shall be incorporated at the dosage rate recommended and tested by the Manufacturer.

5.3.7 Inorganic Corrosion Inhibitors

1 Inorganic corrosion inhibitors shall be based on calcium nitrites capable of oxidizing steel to a more stable form increasing its passivity in the presence of chlorides.

2 Dosage of inorganic corrosion inhibitors ranges from 10 to 30L/m^3 depending on the expected chloride levels as defined by ACI 212 Table 13.1.

3 Other admixtures could be used if approved and directed by the Engineer,

END OF PART