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# 1 CONCRETE BUILDINGS AND STRUCTURES

## 1.1 GENERAL

### 1.1.1 Scope of this Section

- 1 This Section specifies general guidance for maintenance, repair and rehabilitation activities applicable to construction facilities in the State of Qatar.
- 2 This section is to be general guidance (non-compulsory) for related works,
- 3 This section is a non-compulsory section in this version of QCS ( QCS 2018) unless this particular section is specified clearly in the contract to be compulsory.

### 1.1.2 Maintenance, Repair and Rehabilitation Specifications

- 1 Prior to executing rehabilitation, a structural assessment shall be conducted.
- 2 Construction facilities shall be subject to a planned maintenance system and shall be maintained in efficient condition.
- 3 Adapted References provide information and specifications on means and methods of repair, rehabilitation, and strengthening of existing concrete, masonry structures, roads drainage systems and any other construction facilities.

### 1.1.3 Scope of this Part

- 1 This Section specifies general guidance for maintenance, repair and rehabilitation activities applicable concrete elements and structures in the State of Qatar.

### 1.1.4 Adapted References

- 1 The following Codes, Documents are adapted in this section for the related Works:
  - ACI-364 . . . . .Guide for Evaluation of Concrete Structures before Rehabilitation.
  - ACI-201 . . . . .Guide for Making a Condition Survey of Concrete in Service.
  - 345.1R-16 . . . . .Guide to Maintenance of Concrete Bridge Members
  - 345.2R-13: . . . . .Guide for Widening Highway Bridges
  - 369R-11: . . . . .Guide for Seismic Rehabilitation of Existing Concrete Frame Buildings and Commentary
  - 423.4R-14 . . . . .Report on Corrosion and Repair of Unbonded Single-Strand Tendons
  - 423.8R-10: . . . . .Report on Corrosion and Repair of Grouted Multistrand and Bar Tendon Systems
  - 546R-14: . . . . .Guide to Concrete Repair
  - 546.3R-14: . . . . .Guide to Materials Selection for Concrete Repair
  - 546.2R-10: . . . . .Guide to Underwater Repair of Concrete
  - 562-16 . . . . .Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures (ACI 562-16) and Commentary
  - 562M-16 . . . . .Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures and Commentary (Metric)

EN 1991-1-4 .....Eurocode 1. Actions on structures. General actions. Wind actions

2 The published codes and documents approved by the following ACI committees:

- 345 - .....Concrete Bridge Construction, Maintenance, and Repair
- 369 - .....Seismic Repair and Rehabilitation
- 423 - .....Prestressed Concrete (Joint ACI-ASCE)
- 423-0A .....Corrosion and Repair of Unbonded Single-Strand Tendons
- 423-0C .....Corrosion and Repair of Grouted Multistrand and Bar Tendon Systems
- 440 - .....Fiber-Reinforced Polymer Reinforcement
- 440-0F .....FRP-Repair-Strengthening
- 440-0M .....FRP-Repair of Masonry Str
- 546 - .....Repair of Concrete
- 546-0B .....Repair-Material Selection Guide
- 546-0C .....Repair-Guide
- 546-0D .....Packaged Repair Materials
- 546-0E .....Corrosion Studies
- 562 - .....Evaluation, Repair, and Rehabilitation of Concrete Buildings
- 563 - .....Specifications for Repair of Structural Concrete in Buildings
- 563-0A .....General Requirements
- 563-0B .....Shoring
- 563-0C .....Excavation/Surface Preparation
- 563-0D .....Formwork
- 563-0E .....Reinforcement
- 563-0F .....Concrete Mixtures
- 563-0G .....Placing/Curing
- 563-0H .....Architectural/Precast Concrete
- 563-0I .....Proprietary Grouts/Concrete
- 563-0J .....Crack Repair

3 The following standards and other current published relevant EN codes and standards for maintenance, repair and rehabilitation for concrete structures are adapted:

- EN 1504-7. ....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Reinforcement corrosion protection
- EN 1504-9. ....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. General principles for use of products and systems
- EN 1504-4. ....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Structural bonding
- EN 1504-6. ....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Anchoring of reinforcing steel bar

- EN 1504-2:.....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Surface protection systems for concrete
- EN 1504-3 .....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Structural and non-structural repair
- EN 1504-1.....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Definitions
- EN 1504-10.....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Site application of products and systems and quality control of the works
- EN 1504-5. ....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity. Concrete injection
- EN 1504-8. ....Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and AVCP. Quality control and Assessment and verification of the constancy of performance (AVCP)
- EN 1766.....Products and systems for the protection and repair of concrete structures. Test methods. Reference concretes for testing
- EN 14038-1. ....Electrochemical realkalization and chloride extraction treatments for reinforced concrete. Realkalization

## 1.2 OPERATION, INSPECTION AND MAINTENANCE

### 1.2.1 Service Life

- 1 Service life of any construction facility is affected by the possible use of the structure, on the protective measures, on the planned maintenance in service to sustain against the consequences of service and of particular local environmental conditions.
- 2 Maintenance systems aimed to extend the service life of the existing structures,

### 1.2.2 Operation and Inspection

- 1 Inspection for safety system (fire alarm), electrical appliances and systems, structure elements, sanitary system and general conditions etc., should be as needed.
- 2 At least visual inspection should be done for the following recommended period:

Public, Civic and Industrial buildings	Residential Buildings
Yearly: Safety system (fire alarm,..) Electrical appliances and systems	3 years : Safety system (fire alarm,..) Electrical appliances and systems

5 years: Structure elements Sanitary system General conditions	10 years: Structure elements Sanitary system General conditions
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**1.2.3 Maintenance**

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**1.2.4 Rehabilitation**

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**1.2.5 Demolition**

1 Demolition shall need an approval from the Municipality.

**1.2.6 Reuse Phase**

END OF PART