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# UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2014

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## SECTION 03 11 13.00 10

### STRUCTURAL CAST-IN-PLACE CONCRETE FORMING 05/14

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NOTE: This guide specification covers the requirements for formwork for cast-in-place concrete and will be used with Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE or Section 03 31 01.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS. Formwork for architectural cast-in-place concrete is specified in Section 03 33 00 CAST-IN-PLACE ARCHITECTURAL CONCRETE.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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## PART 1 GENERAL

### 1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's

Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

- |         |  |
|---------|--|
| ACI 117 | (2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary |
| ACI 301 | (2010; Errata 2011) Specifications for Structural Concrete   |
| ACI 347 | (2004; Errata 2008; Errata 2012) Guide to Formwork for Concrete  |

#### ASTM INTERNATIONAL (ASTM)

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|-----------|--|
| ASTM C578 | (2014) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation |
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### 1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes

following the "G" typically are not used for Navy, Air Force, and NASA projects.

An "S" following a submittal item indicates that the submittal is required for the Sustainability Notebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REQUIREMENTS. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Formwork[; G][; G, [\_\_\_\_]]  
Form Removal Schedule[; G][; G, [\_\_\_\_]]

#### SD-03 Product Data

Form Materials

#### SD-04 Samples

Sample Panels[; G][; G, [\_\_\_\_]]  
Fiber Voids[; G][; G, [\_\_\_\_]]

#### SD-05 Design Data

Calculations

#### SD-06 Test Reports

Inspection

#### SD-07 Certificates

Fiber Voids

### 1.3 QUALITY ASSURANCE

Provide Sample Panels of sufficient size to contain joints and not less than 2 meters long and 1.5 meters wide 6 feet long and 4 feet wide. The panels shall be of typical wall thickness and constructed containing the full allocation of reinforcing steel that will be used in the structure, with the forming system that duplicates in every detail the one that will be used in construction of the structure. Use the same concrete mixture proportion and materials, the same placement techniques and equipment, and the same finishing techniques and timing that are planned for the

structure. Construction of a finish SF-3.0 will not be permitted until sample panels have been approved. Protect sample panels from construction operations in a manner to protect approved finish, and are not to be removed until all surface finish SF-3.0 concrete has been accepted. After shop drawings have been reviewed, submit sample panels for a surface finish SF-3.0 with applied architectural treatment; build panels on the project site where directed.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

Store fiber voids above ground level in a dry location. Keep fiber voids dry until installed and overlaid with concrete.

### PART 2 PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

The design, engineering, and construction of the formwork is the responsibility of the Contractor. Design formwork in accordance with methodology of [ACI 347](#) for anticipated loads, lateral pressures, and stresses, and capable of withstanding the pressures resulting from placement and vibration of concrete. Comply with the tolerances specified in Section [\[03 31 01.00 10 CAST-IN-PLACE CONCRETE\]](#) [\[03 70 00 MASS CONCRETE\]](#) [\[03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE\]](#), paragraph CONSTRUCTION TOLERANCES. However, for surfaces with an ACI Class A surface designation, limit the allowable deflection for facing material between studs, for studs between walers and walers between bracing to 0.0025 times the span. Design the formwork as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others. Monitor the adequacy of formwork design and construction prior to and during concrete placement as part of the Contractor's approved Quality Control Plan. Submit design analysis and [calculations](#) for form design and methodology used in the design. [Submit at least [\[\\_\\_\\_\\_\\_\]](#) days either before fabrication on site or before delivery of prefabricated forms.]

#### 2.2 FORM MATERIALS

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**NOTE:** This paragraph should be edited to reflect project requirements. Description of classes of finish are contained in Section [03 30 00.00 10 CAST-IN-PLACE CONCRETE](#).

For Civil Works Projects see the appropriate Concrete Materials Design Memorandum and EM 1110-2-2000 for description of class finishes. See paragraph 5.4.e in EM 1110-2-2000 for guidance in selecting appropriate finishes.

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Submit manufacturer's data, including literature describing form materials, accessories, and form releasing agents.

##### 2.2.1 Formwork

Comply with [ACI 301](#) Section 2. Provide for surfaces not exposed to public view a surface finish SF-1.0. Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with [ACI 301](#).

Submit [form removal schedule](#) indicating element and minimum length of time for form removal.

#### 2.2.2 Retain-In-Place Metal Forms

Use retain-in-place metal forms for concrete slabs and roofs as specified in Section [05 30 00 STEEL DECKS](#).

#### 2.2.3 Pan-Form Units

Use factory-fabricated pan-form units of the approximate section indicated for one-way or two-way concrete joist and slab construction. Units must consist of steel or molded fiberglass concrete form pans. Furnish closure units as required.

#### 2.2.4 Fiber Voids

Fiber voids must be the product of a reputable manufacturer regularly engaged in the commercial production of fiber voids. Construct the voids of double faced, corrugated fiberboard. Fabricate the corrugated fiberboard of [wet strength] [standard kraft] paper liners, impregnated with paraffin, and laminated with moisture resistant adhesive, with a board strength of [20 kg/square centimeter 275 psi](#). Voids which are impregnated with paraffin after construction, in lieu of being constructed with paraffin impregnated fiberboard, are acceptable. Design voids to support not less than [4900 kg/square meter 1000 psf](#). To prevent separation during concrete placement fiber voids, assemble with steel or plastic banding at [1.22 m 4 feet](#) on center maximum, or by adequate stapling or gluing as recommended by the manufacturer. Fiber voids placed under concrete slabs and that are [200 mm 8 inches](#) in depth may be heavy duty "waffle box" type, constructed of paraffin impregnated corrugated fiberboard. Submit one sample unit of fiber voids prior to installation of the voids and certificates attesting that fiber voids conform to the specified requirements.

### 2.3 FIBER VOID RETAINERS

#### 2.3.1 Polystyrene Rigid Insulation

Polystyrene rigid insulation must conform to [ASTM C578](#), Type V, VI, or VII, square edged. Size: [38 mm 1-1/2 inches](#) thick by [400 mm 16 inches](#) in height by [1 m 3 feet](#) in length, unless otherwise indicated.

#### 2.3.2 Precast Concrete

Precast concrete units must have a compressive strength of not less than [17 MPa 2500 psi](#), reinforced with [150 mm by 150 mm by W1.4 WWF 6 inch by 6 inch](#) by [W1.4 WWF](#) wire mesh, and [300 mm \(height\) by 1 m \(length\) by 40 mm \(thickness\) 12 inches \(height\) by 3 feet \(length\) by 1-5/8 inches \(thickness\)](#) in size unless indicated.

## PART 3 EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Formwork

Comply with [ACI 301](#) Section 2 with surface tolerances in accordance with [ACI 117](#).

### 3.1.2 Fiber Voids

Place voids on a smooth firm dry bed of suitable material, to avoid being displaced vertically, and set tight, with no buckled cartons, in order that horizontal displacement cannot take place. Seal the ends of each section of void by dipping in paraffin, with any additional cutting of voids at the jobsite field dip in the same type of sealer, unless liners and flutes are completely impregnated with paraffin. Prior to placing reinforcement, cover the entire formed area for slabs with a 1.22 x 2.44 m 4 x 8 feet minimum flat sheets of fiber void corrugated fiberboard. Seal joints with a moisture resistant tape having a minimum width of 75 mm 3 inches. If voids are destroyed or damaged and are not capable of supporting the design load, replace prior to placing of concrete.

### 3.1.3 Fiber Void Retainers

Install fiber void retainers, continuously, on both sides of fiber voids placed under grade beams in order to retain the cavity after the fiber voids biodegrade.

## 3.2 INSPECTION

Inspect forms and embedded items in sufficient time prior to each concrete placement to certify to the Contracting Officer that they are ready to receive concrete. Report the results of each inspection in writing. Submit field inspection reports for concrete forms and embedded items.

-- End of Section --