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This MANU-SPEC™ utilizes the Construction Specifications Institute (CSI) *Manual of Practice*, including *MasterFormat*™, *SectionFormat*™ and *PageFormat*™. A MANU-SPEC is a manufacturer-specific proprietary product specification using the proprietary method of specifying applicable to project specifications and master guide specifications. Optional text is indicated by brackets [ ]; delete optional text in final copy of specification. Specifier Notes typically precede specification text; delete notes in final copy of specification. Trade/brand names with appropriate symbols typically are used in Specifier Notes; symbols are not used in specification text. Metric conversion, where used, is soft metric conversion.

This MANU-SPEC specifies a high reactivity metakaolin (HRM) additive for architectural concrete and high performance cement based systems. This product is manufactured under the trade name MetaMax® by Engelhard Corporation. Revise MANU-SPEC section number and title below to suit project requirements, specification practices and section content. Refer to CSI *MasterFormat* for other section numbers and titles. Requirements for concrete and other cement based products are project specific and, as such, this MANU-SPEC document is not intended to be used as a comprehensive stand-alone section, but rather as a guide for modifying cast-in-place concrete, cast-in-place architectural concrete, plant precast structural concrete, plant precast architectural concrete, tilt-up concrete, glass fiber reinforced concrete, cement plaster and stucco, masonry grouts and mortars, and other similar project specification sections. Contact manufacturer for more information on the specification and use of this product.

SECTION 03050
BASIC CONCRETE MATERIALS & METHODS
(HIGH REACTIVITY METAKAOLIN)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: High Reactivity Metakaolin for Architectural Concrete and High Performance Cement Based Systems.

Specifier Note: Revise paragraph below to suit project requirements. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the paragraph below. Add section numbers and titles per CSI *MasterFormat* and specifier's practice. In the absence of related sections, delete paragraph below.

B. Related Sections:

1. Division 3 Section: Cast-in-Place Concrete.
2. Division 3 Section: Cast-in-Place Architectural Concrete.
3. Division 3 Section: Plant Precast Structural Concrete.
4. Division 3 Section: Plant Precast Architectural Concrete.
5. Division 3 Section: Tilt-up Concrete.
6. Division 3 Section: Glass Fiber Reinforced Concrete.
7. Division 4 Section: Masonry Grouts and Mortars.
8. Division 9 Section: Cement Plaster and Stucco.

Specifier Note: Article below may be omitted when specifying manufacturer's proprietary products and recommended installation.

Retain References Article when specifying products and installation by an industry reference standard. If retained, list standard(s) referenced in this section. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced. Conditions of the Contract or Division 1 References Section may establish the edition date of standards. This article does not require compliance with standard. It is a listing of all references used in this section.

1.02 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. American Concrete Institute (ACI):

1. ACI 318-02 Building Code Requirements for Structural Concrete (ACI 318-02) and Commentary (ACI 318R-02) - an ACI Standard.

C. ASTM International:

1. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

D. International Standards Organization (ISO):

1. ISO 9002 - Quality Systems - Model For Quality Assurance In Production, Installation and Servicing (Same as BS5750 P2, ASQC Q92 and SAA AS 3902).

1.03 DEFINITIONS

A. Special definitions that apply to this section include:

1. High Reactivity Metakaolin: An ultrafine pozzolan that enhances the strength, durability and workability of Portland cement concrete and cement based products.

Specifier Note: Article below should be restricted to statements describing design or performance requirements and functional (not dimensional) tolerances of a complete system. Limit descriptions to composite and operational properties required to link components of a system together, and to interface with other systems.

1.04 SYSTEM DESCRIPTION

A. Design Requirements: Provide [Specify products/systems.] that have been manufactured, fabricated and installed to [Specify design criteria.].

B. Performance Requirements: Provide [Specify products/systems.] that have been manufactured, fabricated and installed to [Specify performance criteria.].

Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in Conditions of the Contract and Division 1 Submittal Procedures Section.

1.05 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer's product data and installation instructions.

C. Shop Drawings: Provide drawings indicating [Specify shop drawing requirements.].

D. Samples: Submit selection and verification samples.

E. Quality Assurance/Control Submittals: Submit the following:

1. Design Data: [Specify design data.].

2. Test Reports: [Specify test report requirements.].

3. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.

4. Manufacturer's Field Reports: [Specify manufacturer field report requirements.].

Specifier Note: Article below should include statements of prerequisites, standards, limitations and criteria that establish an overall level of quality for products and workmanship for this section. Coordinate article below with Division 1 Quality Assurance Section.

1.06 QUALITY ASSURANCE

A. [Installer] [Applicator] Qualifications: Utilize an [Installer] [Applicator] having demonstrated experience on projects of similar size and complexity.

Specifier Note: Paragraph below should list obligations for compliance with specific code requirements particular to this section. General statements to comply with a particular code are typically addressed in Conditions of the Contract and Division 1 Regulatory Requirements Section. Repetitive statements should be avoided.

B. Regulatory Requirements and Approvals: [Specify applicable requirements of regulatory agencies.].

1. [Code agency name].

a. [Report or approval number].

C. Certifications: [Specify requirements for certifications.].

D. Field Samples: [Specify requirements for field samples.].

Specifier Note: Retain paragraph below if mock-up is required.

E. Mock-Ups: [Specify requirements for mock-up.].

1. Subject to acceptance by owner, mock-up may be retained as part of finish work.

2. If mock-up is not retained, remove and properly dispose of mock-up.

Specifier Note: Retain paragraph below if preinstallation meeting is required.

F. Preinstallation Meetings: [Specify requirements for meetings.].

Specifier Note: Article below should include specific protection and environmental conditions required during storage. Coordinate article below with Division 1 Product Requirements Section.

1.07 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

Specifier Note: In article below, state physical or environmental limitations or criteria for installation such as weather, temperature, humidity, ventilation or illumination required for proper installation or application.

1.08 PROJECT/SITE CONDITIONS

A. Environmental Requirements: [Specify environmental requirements.].

Specifier Note: Coordinate article below with Conditions of the Contract and with Division 1 Closeout Submittals (Warranty) Section. Use this article to require special or extended warranty or bond covering the work of this section.

1.09 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.

Specifier Note: Coordinate subparagraph below with manufacturer's warranty requirements.

1. Warranty Period: [Insert years.] beginning with Date of Substantial Completion.

PART 2 PRODUCTS

Specifier Note: Retain article below for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as “or equal” or “or approved equal” or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining “or equal” products.

2.01 HIGH REACTIVITY METAKAOLIN

Specifier Note: Paragraph below is an addition to CSI *SectionFormat* and a supplement to MANU-SPEC. Retain, edit or delete paragraph below to suit project requirements and specifier practice.

A. Manufacturer: Engelhard Corporation.

1. Contact: 101 Wood Avenue, PO Box 770, Iselin, NJ 08830-0770; Telephone: (800) 758-9567, Ext. 5654, (732) 205-5398; Fax: (732) 321-1598; E-mail: metamax@engelhard.com; Web site: www.engelhard.com/metamax.

B. Proprietary Products/Systems: Metakaolin additive, including the following:

1. MetaMax High Reactivity Metakaolin:

a. Material Composition: Amorphous aluminosilicate formed by controlled calcination of kaolinite.

b. Material Standard: Exceed chemical composition requirements of ASTM C618.

c. Quality Requirement: Material produced in a facility certified under ISO 9002.

Specifier Note: Edit Article below to suit project requirements. If substitutions are permitted, edit text below. Add text to refer to Division 1 Project Requirements (Product Substitutions Procedures) Section.

2.02 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

Specifier Note: Specify subordinate or secondary items that aid and assist primary products specified above or are necessary for preparation or installation of those items.

2.03 ACCESSORIES

A. [Specify requirements for accessories.].

Specifier Note: Specify proportions and procedures for site mixing materials. Mixing is the preparation of materials for use and is considered to be part of the manufacturing process.

Specifier Note: Optimum dosage of MetaMax HRM varies depending upon project requirements and other materials in the mixture. As a general guideline, add 10 to 15% MetaMax HRM by weight of Portland cement (10 to 15 pounds of MetaMax HRM per 100 pounds of Portland cement) to increase strength, control efflorescence and reduce permeability. Add 15 to 20% for increased resistance to chemical attack and alkali-silica reactivity. Use of MetaMax HRM on a replacement basis should allow the amount of Portland cement in a mixture to be reduced. MetaMax HRM can also be combined with fly ash or other pozzolanic materials for synergistic effects, including early strength development in fly ash concrete. Test data demonstrating the performance of various concrete mixtures containing MetaMax HRM is available from the manufacturer. For additional information on mix design, consult a qualified materials engineer and applicable publications available from the American Concrete Institute (ACI) and the Portland Cement Association (PCA).

2.04 MIXES

A. [Specify mix requirements.].

Specifier Note: Specify requirements for quality control at offsite fabrication plants.

2.05 SOURCE QUALITY CONTROL

A. Fabrication Tolerances: [Specify fabrication tolerances.].

B. Tests, Inspection: [Specify test and inspection requirements.].

C. Verification of Performance: [Specify performance verification requirements.].

PART 3 EXECUTION

Specifier Note: Article below is an addition to the CSI *SectionFormat* and a supplement to MANU-SPEC. Revise article below to suit project requirements and specifier's practice.

3.01 MANUFACTURER'S INSTRUCTIONS

A. Comply with the instructions and recommendations of the High Reactivity Metakaolin manufacturer.

Specifier Note: Specify requirements where an unusually high quality of workmanship is required.

3.02 ACCEPTABLE INSTALLERS

A. [Specify requirements for acceptable installers.].

Specifier Note: Specify actions to physically determine that conditions are acceptable to receive primary products of the section.

3.03 EXAMINATION

A. Site Verification of Conditions:

1. Verify that site conditions are acceptable for [Installation] [Application] of [Insert concrete or cement-based product.].
2. Do not proceed with [Installation] [Application] of [Insert concrete or cement based product.] until unacceptable conditions are corrected.

Specifier Note: Specify actions required to physically prepare the surface, area or site or to incorporate the primary products of the section.

3.04 PREPARATION

A. Protection: [Specify protection requirements.].

B. Surface Preparation: [Specify surface preparation requirements.].

Specifier Note: Coordinate article below with manufacturer's recommended installation, application or construction requirements. Concrete made with MetaMax HRM can be placed and finished using conventional concrete techniques. Concrete work should be performed in accordance with ACI and other applicable requirements.

3.05 [INSTALLATION] [APPLICATION] [CONSTRUCTION]

A. General: Comply with requirements of ACI 318-02.

Specifier Note: MetaMax HRM should generally be added to a concrete batch after Portland cement and before any high-range water reducer (superplasticizer) is added.

B. Mixing: [Specify mixing requirements.].

C. Special Techniques: [Specify requirements for spacing, patterns, unique treatments.].

D. Interface with Other Work: [Specify requirements for compatibility, transition, anchorage, separation, bonding.].

E. Sequences of Operation: [Specify required sequences.].

F. Site Tolerances: [Specify allowable variations.].

Specifier Note: Specify the tests and inspections required for installed or completed work.

3.06 FIELD QUALITY CONTROL

A. Site Tests: [Specify requirements for site tests.].

B. Inspection: [Specify requirements for inspections.].

C. Manufacturer's Field Services: [Specify requirements for manufacturer's field services.].

Specifier Note: Specify the final actions required to clean installed equipment or other completed work to properly function or perform.

Coordinate article below with Division 1 Execution Requirements (Cleaning) Section.

3.07 CLEANING

A. [Specify requirements for cleaning.].

Specifier Note: Specify provisions for protecting work after installation but prior to acceptance by the owner. Coordinate article below with Division 1 Execution Requirements Section.

3.08 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION