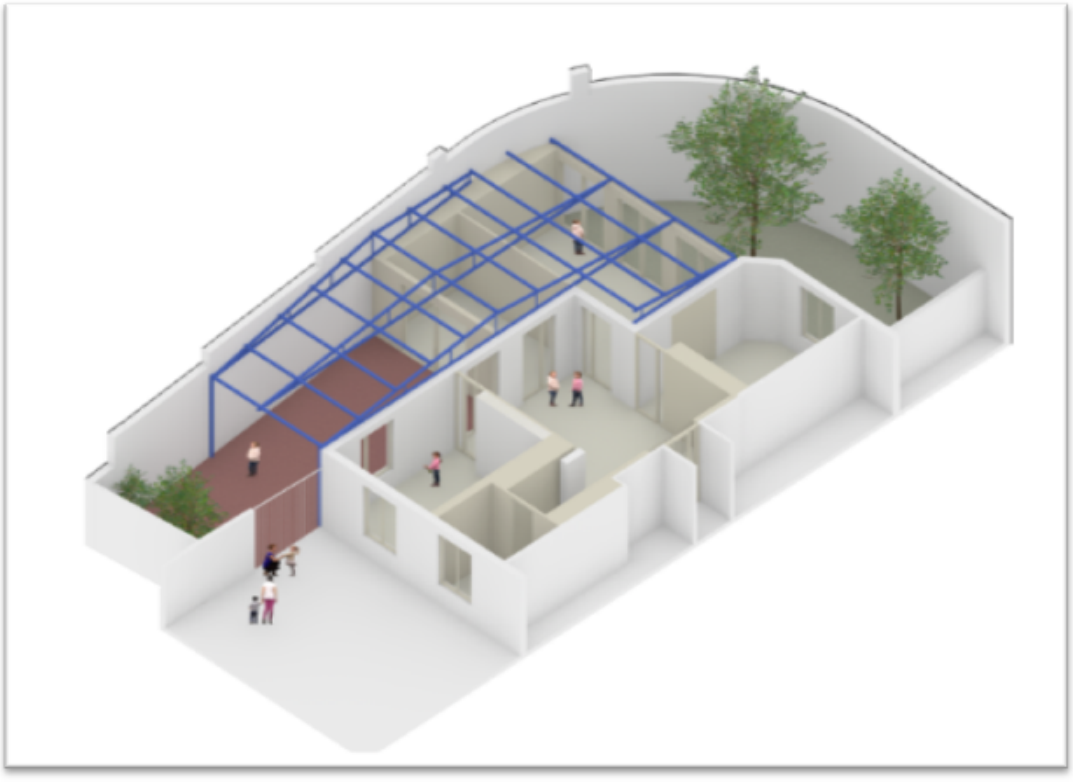
MOL Nursery, 7th Circle

VOLUME 2

TECHNICAL SPECIFICATIONS



APRIL, 2022

A. GENERAL TECHNICAL SPECIFICATION

B. PARTICULAR TECHNICAL SPECIFICATION

A. GENERAL TECHNICAL SPECIFICATION

Technical Specifications

DIVISION 1

GENERAL REQUIREMENTS

Ref.	Description
011000	Summary of Work
013113	Project Co-Ordination
013119	Co-ordination and Meetings
013300	Submittals
014000	Quality Requirement
014529	Testing Laboratory Services
017400	Cleaning and Waste Management

SECTION 01 10 00 Summary of Work

PART 1 GENERAL

1.01 Work Covered by Contract Documents/Requirements Included

The Work of this Contract comprises but is not limited to the construction, completion of **MOL Nursery, 7th Circle,** all as shown on the relevant drawings.

1.02 Related Requirements

A. Instructions to Tenderers.

B. Conditions of Contract.

1.03 Contracts

A. Construct the Work under a "Re-measured" work contract.

END OF SECTION

SECTION 01 31 13 PROJECT COORDINATION

PART 1 GENERAL

1.01 Section Includes

A. Project coordination by the Project Coordinator.

B. Construction mobilization.

C. Schedules.

D. Submittals.

E. Coordination drawings.

F. Close-out procedures.

1.02 Related Sections

A. General Conditions: Duties of the Supervising Engineer/Owner's Representative; unless otherwise noted.

B. Section 011 000: Summary of Work.

1.03 Project Coordinator

A. Project Coordinator: Main Contractor.

1.04 Construction Mobilization

A. Cooperate with the Supervising Engineer/Owner's Representative in allocation of mobilization areas of site; for field offices and sheds, for access, traffic, and parking facilities.

B. During construction, coordinate use of site and facilities through the Supervising Engineer/Owner's Representative.

C. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

1.04 Construction Mobilization (cont'd)

D. Comply with instructions of the Supervising Engineer/Owner's Representative for use of temporary utilities and construction facilities.

E. Coordinate field engineering and layout work under instructions of the Construction Manager /Owner's Representative.

1.05 Schedules

A. Submit preliminary progress schedule in accordance with Section 013 300 and coordinated with Project construction schedule.

B. After review, revise and resubmit schedule to comply with revised Project schedule.

C. During progress of work revise and resubmit as directed.

1.06 Submittals

A. Submit preliminary shop drawings, product data and samples in accordance with Section 01300 for review and compliance with Contract Documents, for field dimensions and clearances, for relation to available space, and for relation to work of separate contracts. Revise and resubmit as required.

B. Submit applications for payment on forms for review, and to Supervising Engineer/Owner's Representative.

C. Submit requests for interpretation of Contract Documents, and obtain instructions through the Construction Manager / Owner's Representative.

D. Process requests for substitutions, and change orders, through the Construction Manager /Owner's Representative.

E. Deliver close-out submittals for review and preliminary inspection reports, to Construction Manager /Owner's Representative.

1.07 Coordination Drawings

A. Provide information required by Construction Manager /Owner's Representative for preparation of coordination drawings.

B. Review drawings prior to submission to Construction Manager /Owner's Representative.

1.08 Close-Out Procedures

A. Notify Construction Manager /Owner's Representative when Work is considered ready for Substantial Completion.

B. Comply with Engineer's instructions to correct items of work listed in executed Certificates of Substantial Completion.

C. Notify Construction Manager /Owner's Representative when Work is considered finally complete.

D. Comply with Construction Manager /Owner's Representative's instructions for completion of items of Work determined by Supervising Engineer/Owner's Representative 's final inspection.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 1 COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 Section Includes

A. Coordination

B. Pre-construction meeting

C. Site mobilization meeting

D. Progress meetings

E. Pre-installation meetings

F. Examination

G. Preparation

H. Cutting and Patching

I. Alteration project procedures.

1.02 Related Sections

A. Section 01 31 13: Project Coordination: Coordination with Construction Manager

1.03 Coordination

A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

1.03 Coordination (Cont'd)

C. Coordinate space requirements and installation of mechanical and electrical work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.04 Pre-construction Meeting

A. Construction Manager's Representative will schedule a meeting after Notice of Award.

B. Attendance Required: Construction Manager's Representative/ Engineer /Quantity Surveyor and Contractor.

C. Agenda:

1) Execution of Owner-Contractor Agreement.

2) Submission of executed bonds and insurance certificates.

3) Distribution of Contract Documents.

4) Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.

5) Designation of personnel representing the parties in Contract, and the Supervising Engineer/Owner's Representative.

6) Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract close-out procedures.

7) Scheduling.

1.04 Pre-construction Meeting (Cont'd)

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Supervising Engineer/Owner's Representative, Owner, participants, and those affected by decisions made.

1.05 Site Mobilization Meeting

A. Supervising Engineer/Owner's Representative will schedule a meeting at the Project site prior to Contractor occupancy.

B. Attendance Required: Supervising Engineer/Owner's Representative, Special Consultant, Contractor, and major Subcontractors.

C. Agenda:

1) Use of premises by Owner and Contractor.

2) Owner's requirements.

3) Construction facilities and controls provided by Owner.

4) Temporary utilities provided by Owner.

5) Survey and building layout.

6) Security and housekeeping procedures.

7) Schedules.

8) Procedures for testing.

9) Procedures for maintaining record documents.

10) Requirements for start-up of equipment.

11) Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Supervising Engineer/Owner's Representative, Owner, participants, and those affected by decisions made.

1.06 Progress Meetings

A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

1.06 Progress Meetings (cont'd)

C. Attendance Required: Main Contractor, major Subcontractors and Suppliers, Owner, Supervising Engineer/Owner's Representative, Engineer, Quantity Surveyor, as appropriate to agenda topics for each meeting.

D. Agenda:

1) Review minutes of previous meetings.

2) Review of Work progress.

3) Field observations, problems, and decisions.

4) Identification of problems which impede planned progress.

5) Review of submittals schedule and status of submittals.

6) Review of off-site fabrication and delivery schedules.

7) Maintenance of progress schedule.

8) Corrective measures to regain projected schedules.

9) Planned progress during succeeding work period.

10) Coordination of projected progress.

11) Maintenance of quality and work standards.

12) Effect of proposed changes on progress schedule and coordination.

13) Other business relating to Work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Supervising Engineer/Owner's Representative, Owner, participants, and those affected by decisions made.

1.07 Pre-installation Meeting

A. When required in individual specification sections, convene a Pre-installation meeting at work site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Construction Manager /Owner's Representative four days in advance of meeting date.

1.07 Pre-installation Meeting (Cont'd)

D. Prepare agenda and preside at meeting:

1) Review conditions of installation, preparation and installation procedures.

2) Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Supervising Engineer/Owner's Representative, Owner, participants, and those affected by decisions made.

PART 2 PRODUCTS - NOT USED-

PART 3 EXECUTION - NOT USED -

END OF SECTION

SECTION 01 33 00 SUBMITTALS

PART 1 GENERAL

1.01 Section Includes

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed Products list.

D. Shop Drawings.

E. Product Data.

F. Samples.

G. Manufacturer's installation instructions.

H. Manufacturers' certificates.

I. Construction photographs.

1.02 Submittal Procedures

A. Transmit each submittal with an approved transmittal form to the Construction Manager / Owner’s Representative.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or Supplier; pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

1.02 Submittal Procedures (cont'd)

E. Schedule submittals to expedite the Project, and deliver to Supervising Engineer/Owner's Representative at Site Office. Coordinate submission of related items.

F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

G. Provide space for Contractor and Supervising Engineer/Owner's Representative review stamps.

H. Revise and resubmit, identify all changes made since previous submission.

I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with provisions.

J. Submittals not requested will not be recognized or processed.

1.03 Proposed Products List

A. Within 30 days after date of Owner-Contractor Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.04 Shop Drawings

A. Submit in the form of one reproducible and the number of opaque reproductions which Contractor requires, plus two copies which will be retained by Supervising Engineer/Owner's Representative.

B. Shop Drawings: Submit for review. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above.

C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.05 Product Data

A. Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Construction Manager and one copy for the Owner's Representative.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.

C. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents as per Conditions of Contract.

1.06 Samples

A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

B. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Supervising Engineer/Owner's Representative selection.

C. Include identification on each sample, with full Project information.

D. Submit the number of samples specified in individual specification sections; one of which will be retained by Supervising Engineer/Owner's Representative.

E. Reviewed samples which may be used in the Work are indicated in individual specification sections.

1.07 Manufacturer Installation Instructions

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Supervising Engineer/Owner's Representative in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.08 Manufacturer Certificates

A. When specified in individual specification sections, submit certification by manufacturer to the Supervising Engineer/Owner's Representative, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Supervising Engineer/Owner's Representative.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 40 00 QUALITY REQUIREMENT

PART 1 GENERAL

1.01 Requirements Included

A. General Quality Control.

B. Mock-ups.

C. Manufacturers' Field Services.

1.02 Related Requirements

A. Conditions of the Contract: Inspection and testing required by governing authorities.

1.03 Quality Control, General

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.04 Mock-Up

A. Erect field Samples and Mock-ups at Project site in accordance with requirements of the Specification section.

B. Provide travel facilities for the Supervision Engineer /Owner's Representative where necessary to inspect samples or materials inside or outside Jordan.

1.05 Manufacturers' Field Services

A. When specified in respective Specification sections, require supplier or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.

B. Representative shall submit written report to Supervision Engineer /Owner's Representative listing observations and recommendations.

END OF SECTION

SECTION 01 45 29 TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 Requirements Included

A. Contractor shall employ and pay for the services of an Independent Testing Laboratory to perform specific services and testing.

1.02 Related Requirements

A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities:

B. Related Requirements Specified in Other Sections:

C. Respective sections of specifications: Certification of products.

D. Each specification section listed: Laboratory tests required, and standards for testing.

E. Testing Laboratory inspection, sampling and testing is required as elsewhere indicated in Contract Documents.

1.03 Qualification Of Laboratory

A. Meet "Recommended Requirements for Independent Laboratory Qualification", published by American Council of Independent Laboratories.

B. Meet basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."

C. Authorized to operate in Jordan.

D. Testing Equipment:

1. Calibrated at reasonable intervals by devices of accuracy traceable to either:

    a. National Bureau of Standards.
    b. Accepted values of natural physical constants.

1.04 Laboratory Duties

A. Cooperate with the Supervising Engineer/Owner's Representative and Contractor; provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards.
2. Ascertain compliance of materials with requirements of Contract Documents.

C. Promptly notify the Supervising Engineer/Owner's Representative and Contractor of observed irregularities or deficiencies of work or products.

D. Promptly submit five copies of written report of each test and inspection to Supervising Engineer/Owner's Representative. Each report shall include:

1. Date of test.
2. Project title and number.
3. Testing laboratory name, address and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in the Project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.
12. Interpretation of test results, when requested by the Supervising Engineer/Owner's Representative.

E. Perform additional tests as required by the Supervising Engineer/Owner's Representative or the Owner.

1.05 Limitations of Authority of Testing Laboratory

A. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of the Work.
3. Perform any duties of the Contractor.

1.06 Contractor's Responsibilities

A. Cooperate with laboratory personnel; provide access to Work, to Manufacturer's operations.

B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.

D. Furnish copies of Products test reports as required.

E. Furnish incidental labor and facilities:
   1. To provide access to Work to be tested.
   2. To obtain and handle samples at the Project site or at the source of the product to be tested.
   3. To facilitate inspections and tests.
   4. For storage and curing of test samples.

F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

   1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.

G. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required:

   1. For the Contractor's convenience.
   2. When initial tests indicate Work does not comply with Contract Documents.

H. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.

I. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate Work does not comply with Contract Documents.

END OF SECTION

SECTION 01 74 00 CLEANING AND WASTE MANAGEMENT

PART 1 GENERAL

1.01 Requirements Included

A. Execute cleaning, during progress of the Work, and at completion of the Work.

1.02 Related Requirements

A. Conditions of the Contract.

B. Each Specification Section: Cleaning for specific Products or work.

1.03 Disposal Requirements

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

B. Contractors to prevent any contamination or discharge of construction debris into the waters of the lagoons.

PART 2 PRODUCTS

2.01 Materials

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 During Construction

A. Execute periodic cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from demolition works, and construction operations.

C. Provide on-site containers for the collection of waste materials, debris and rubbish.

3.01 During Construction (Cont'd)

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 Dust Control

A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 Final Cleaning

A. Employ skilled workmen for final cleaning.

B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.

C. Wash and shine glazing and mirrors.

D. Polish glossy surfaces to a clear shine.

E. Ventilating Systems:

1. Clean permanent filters and replace disposable filters if units were operated during construction.

2. Clean ducts, blowers and coils if units were operated without filters during construction.

F. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

G. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

H. The Contractor will assume responsibility for final cleaning of interior and exterior surfaces of buildings before handing over.

I. Contractor: broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

END OF SECTION

DIVISION 3

CONCRETE

Ref.	Description
031100	Concrete Forming
032000	Concrete Reinforcing
033000	Cast-In-Place Concrete
033900	Concrete Curing

SECTION 03 11 00 CONCRETE FORMING

PART 1 GENERAL

1.01 Scope of Work

A. Pre-formed construction joints

B. Dovetail anchor slots.

C. Waterstops and external rear guards.

D. Flashing reglets.

E. Void Forms.

F. Forming of expansion joints.

1.02 Related Work

A. Section 03 20 00: Concrete Reinforcing.

B. Section 03 30 00: Cast-in-Place Concrete.

C. Supports, Anchors and Seals for mechanical installations.

D. Supporting Devices for electrical installations.

1.03 Quality Assurance

A. Construct and erect concrete formwork in accordance with ACI 347, Jordanian General Specifications – 1996 and applicable construction safety regulations for place of Work.

1.04 Reference Standards

A) ACI 347 - Recommended Practice for Concrete Formwork.

1.05 Shop Drawings

A. Submit shop drawings in accordance with Section 01340.

B. Indicate pertinent dimensioning, methods of construction, materials, arrangement of joints, ties and shores, location of bracing and temporary supports, schedule of erection and stripping.

C. Prepare shop drawings under seal of Professional Structural Engineer.

PART 2 PRODUCTS

2.01 Wood Form Materials

A) Plywood: sound undamaged sheets with clean true edges.

B) Lumber: spruce species; sheathing grade; with grade stamp clearly visible.

C) Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required; of sufficient strength and character to maintain formwork in place while pouring concrete.

2.02 Polystyrene Roofing Blocks

The blocks shall be of low density expanded polystyrene and shall be fixed in place to the shuttering to ensure no movement during concreting.
The forms, together with the supports, shall be of an approved manufacture, and must be approved by the Supervising Engineer as one complete system before proceeding with associated work.

2.03 Acceptable Manufacturers

A) Acceptable Manufacturers:

1. The Contractor shall submit to the Supervising Engineer the names of three manufacturers and their products which will be acceptable under this section. Approval of the manufacturer or product must be obtained before proceeding with associated work.

2.04 Concrete Accessories

A) Flashing Reglets: Minimum 0.6 mm thick galvanized steel longest possible lengths; complete with alignments splines for joints; securable to concrete formwork as approved by the Supervising Engineer; manufacturer subject to approval of the Supervising Engineer.

B) Approved compressible filler in the form of permanent formwork, to be used as expansion joint filler, and a cold applied sealant consisting of self-curing polysulphide rubber, manufactured by an approved manufacturer.

PART 3 EXECUTION

3.01 Formwork Erection

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.
B. Construct formwork, shoring and bracing to meet design and code requirements, so that resultant finished concrete conforms to required shapes, lines and dimensions.
C. Arrange and assemble formwork to permit dismantling and stripping, so that concrete is not damaged during its removal.
D. Align joints and make watertight, to prevent leakage of mortar and disfigure appearance of concrete. Keep form joints to minimum.
E. Obtain the Supervising Engineer's review for use of earth forms. When using earth forms, hand-trim sides and bottoms, and remove loose dirt prior to placing concrete.
F. Arrange forms to allow stripping without removal of principal shores, where and when these are required to remain in place.
G. Obtain the Supervising Engineer's review before framing openings in structural members, which are not indicated on drawings.
H. Provide bracing to ensure stability of formwork. Prop or strengthen previously constructed formwork liable to be over stressed by construction loads.
I. Provide chamfer strips on external corners of members only where shown on drawings.
J. Construct formwork to provide completed concrete surfaces complying with the tolerances specified in A.C.I. 347, after removal of forms and prior to patching and finishing of cast - in - place formed surfaces.
K. Form expansion joints in the positions shown on the drawings and finish-off as follows:
- Joint filled with a compressible filler in the form of permanent formwork.
- Cold applied joint sealant consisting of self-curing approved polysulphide rubber.

L. Apply form release agent on formwork in accordance with manufacturer's recommendations. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.
M. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.
N. Where trough forms are used, the finished concrete surface must be finished fairfaced.

3.02 Inserts, Embedded Parts, And Openings

A. Provide formed openings where required for pipes, conduits, sleeves, and other work to be embedded in and passing through concrete members.

B. Locate and set in place items which will be cast directly into concrete.

C. Coordinate work of other sections and cooperate with trade involved in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts. Do not perform work unless specifically indicated on drawings or reviewed prior to installation.

D. Install concrete accessories in accordance with manufacturer's recommendations; straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Install Water stops continuous without displacing reinforcement. Heat seal joints watertight.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close temporary ports or openings with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

3.03 Field Quality Control

A. Inspect and check completed formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and parts are secure.

B. Inform the Supervising Engineer when formwork is complete and has been cleaned, to allow for inspection. Obtain review prior to placing concrete.

C. Allow the Supervising Engineer to inspect each section of formwork prior to reuse.

3.05 Cleaning

A. Clean forms as erection proceeds, to remove foreign matter. Remove cuttings, shavings, and debris from within forms. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-outs ports.

B. During cold weather, remove ice from within forms. Do not use de-icing salts. Do not use water to clean out completed forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.06 Form Removal

A. Notify Supervising Engineer prior to removing formwork.

B. Do not remove forms, shores and bracing until concrete has gained sufficient strength to carry its own weight, and construction and design load which are liable to be imposed upon it. Verify strength of concrete by compressive test results.

C. Remove formwork progressively and in accordance with code requirements and so that no shock loads or unbalanced loads are imposed on structure.

D. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.

E. Leave forms loosely in place, against vertical surfaces, for protection until complete removal is approved by the Supervising Engineer.

F. Store removed forms, for exposed architectural concrete, in manner that surfaces to be in contact with fresh concrete will not be damaged. Marked or scored forms will be rejected.

G. Reshore structural members where required due to design requirements or construction conditions and as required to permit progressive construction. Remove load supporting forms only when concrete has attained 75 percent of required 28 day compressive strength, provided construction is reshored.

H. Remove forms not directly supporting weight of concrete as soon as stripping operations will not damage concrete.

END OF SECTION

SECTION 03 20 00 CONCRETE REINFORCING

PART 1 GENERAL

1.01 Scope of Work

A. Work includes furnish and install reinforcement and associated items required and or indicated on drawings for cast in place concrete.

B. Reinforcing steel bars in various diameters including spacers, chairs, couplers in substructure including strip and single footings, raft foundations under water tanks, columns and walls.

C. Reinforcing steel bars in various diameters including spacers, chairs, couplers in superstructure including columns, core walls, suspended slabs, stairs, and beams.

D. The structural drawings have been prepared to indicate the design reinforcement required for all structural members. It is the Contractors responsibility to use the design drawings to prepare shop details and reinforcement bending schedules for the structural elements.

1.02 Related Work

A. Section 03 30 00: Cast-in-place concrete.

1.03 Quality Assurance

A. Perform concrete reinforcing work in accordance with CRSI 63 and 65 unless specified otherwise in this section.

1.04 Source Quality Control

A. Submit 3 certified copies of mill test report of supplied concrete reinforcing, indicating physical and chemical analysis for each site delivery.

B. Provide the Supervising Engineer/Owner's Representative with access to fabrication plant to facilitate inspection of reinforcement. Notify of commencement and duration of shop fabrication, in sufficient time to allow for proper inspection.

1.05 Reference Standards

A. BS 8110 - Code of practice for design and construction of structural concrete.

B. CRSI 63 - Recommended Practice for Placing Reinforcing Bars.

C. CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and
1. Nomenclature.

D. BS 4483 - Steel fabric for reinforcement of concrete

E. BS4449 - Hot rolled steel bars for the reinforcement of concrete.

F. Jordanian General Specifications – 1996

G. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts Connections
in a. Reinforced Concrete Construction.

H. ACI 315 - American Concrete Institute - Manual of Standard

PART 2 PRODUCTS

2.01 Reinforcing

Grade Minimum	Yield Strength
High Yield Steel	420 N/mm^2
Mild Yield Steel	280 N/mm^2

A. Reinforcing Steel: High yield deformed weldable steel bars, BS 4449 and BS 4461.

B. Welded Steel Wire Fabric: Deformed type, BS 4493; in flat sheets.

2.02 Quality Requirements

A. Steel reinforcement shall be 280 N/mm^2 for mild yield steel and 420 N/mm^2 high yield steel complying with requirements of BS 4449, BS 4461 and BS 8110, deformed bars.

B. Steel fabric mesh shall comply with BS 4483.

2.03 Fabrication

A. Fabricate concrete reinforcing in accordance with ACI 315.

B. Locate reinforcing splices, not indicated on drawings, at points of minimum stress. Location of splices: to be reviewed by the Supervising Engineer/Owner's Representative.

2.04 Accessory Materials

A. Tie Wire: Minimum 1.5mm gauge annealed type, or patented system accepted by Supervising Engineer/Owner's Representative.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcing during construction conditions.

C. Special Chairs, Bolsters, Bar Supports, Spacers where adjacent to architectural concrete surfaces: Plastic coated type; sized and shaped as required.

PART 3 EXECUTION

3.01 Placement and Fixing of Reinforcement

A. Place reinforcing supported and secured against displacement. Do not deviate from true alignment.

B. Before placing concrete, ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings which would reduce bond to concrete.

C. All reinforcement shall be fixed rigidly in position. At intersections the bars shall be bound together with tying wire and the loose ends of the wire shall be turned towards the inside of the member.

D. Reinforcement shall only be spliced or welded where shown on the drawings. All welding procedures shall be subject to approval.

E. Reinforcement shall be fixed in the positions shown on the drawings within a tolerance of 5mm of 5% of the lowest dimension of the cross-section of the member, whichever is greater.

F. The concrete cover to the reinforcement shall be carefully maintained utilizing approved spacers where necessary. Unless indicated elsewhere in the contract documentation, the minimum concrete cover to all steel shall be in accordance with the drawings.

G. Where concrete spacer blocks are used they shall not exceed 50mm square in section and shall be precast from concrete of similar mix proportions and strength as the adjacent concrete, except that the largest size of aggregate shall be 10mm.

H. Spacer blocks shall not be used where the concrete face will be visible in the finished work, without the approval of the Supervising Engineer/Owner's Representative.

I. Each concrete spacer block shall be securely fixed to the reinforcement with wire or a clip. The wire or clip shall be embedded in the center of the blocks so that it does not subsequently cause rust marks on the concrete surface.

J. Supports and other subsidiary bars necessary to maintain the reinforcement in position shall be provided at approved intervals with concrete cover not less than that of the adjacent reinforcement.

3.01 Placement and Fixing of Reinforcement (cont'd)

A. Fabric reinforcement shall be used in standard sheets where possible. Adjoining sheets shall overlap by at least one rectangle or 60 diameters of the bar at the lap, whichever is the greater.

B. Scaffold boards shall be provided to ensure that the reinforcement is not displaced by being walked upon during concreting or other operations.

C. During concreting operations, a competent steel fixer shall be in attendance to ensure that the reinforcement is maintained in the position as pouring and compaction proceeds.

3.02 Measurements and Rates

A. Calculation of Steel reinforcement bars weight as shown below:

Diameter (mm)	Weight(kg/m)
6	0.222
8	0.395
10	0.617
12	0.888
14	1.210
16	1.580
18	2.000
20	2.460
22	2.980
24	3.550
25	3.850
26	4.170
30	5.550
32	6.318

END OF SECTION

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

This section specifies work required for plain, reinforced and precast concrete.

1.01 Scope of Work

Provide cast in place ready mix concrete with characteristic strength at 28 days (as defined by a 150mm cube according to BS 1881 -116:1983, Testing concrete method for determination of compressive strength of concrete cubes, for the different components of the structure.

1.02 Standards

All work shall be carried out in accordance with the following Reference Standards-

A. The British Standard for structural use of concrete - BS 8110.

B. The American Concrete Institute, A.C.I 318M12.

C. The American Society for Testing Materials.

D. The American Association of State Highway and Transportation Officials (AASHTO).

E. Jordan National Building Code.

In case of discrepancy between this specification and the above reference standards, this specification shall take precedence.

1.03 Ordinary Structural Concrete

All plain, reinforced insitu, and precast concrete for general structural use is designed and must be constructed in accordance with BS - 8110.

1.04 Ready Mix Concrete

The Contractor shall submit the names of the proposed suppliers to the Supervising Engineer/Owner's Representative with their design mixes for each class of concrete used in this project as well as the sources of all materials to be incorporated in the mix. The Contractor shall also submit to the Supervising Engineer/Owner's Representative evidence of quality assurance management which the supplier adopts, for the Supervising Engineer/Owner's Representative review and approval prior to proceeding with the works.

The Contractor shall undertake and arrange for the Supervising Engineer/Owner's Representative to inspect the suppliers site concerning the Batch Plant and materials used by the Supplier and on regular intervals as and when directed by the Supervising Engineer/Owner's Representative.

The Contractor should provide all assistance and facilities including transportation to this regard.

1.05 Samples and Testing Of Materials

Prior to commencement of the concrete works, the Contractor shall submit samples of materials to the Supervising Engineer/Owner's Representative before sending them to nominated approved laboratories for testing, in order to establish the probability of the materials passing tests for the specified requirements.

Such samples shall be in sufficient amounts to enable test to be carried out and shall not be less than the quantities stated below

Cement	A mixed sample of equal quantities taken from at least one bag in every twenty, totaling 50 Kg for every batch of cement delivered to site.
Fine Aggregate & Sand for Mortar	0.03 m3 for each mix of concrete or for each size of aggregate.
Coarse Aggregate	0.03 m3.

Once the Supervising Engineer/Owner's Representative is satisfied that the samples with their sources are truly representative samples and sufficient quantities of these materials are readily available for the completion of all concrete works, then they shall be sent to the nominated approved laboratories for testing.

The Contractor shall have all laboratory tests made at his own expense.

During construction, all concrete, aggregate, cement and water shall be sampled and tested as frequently as deemed necessary by the Supervising Engineer/Owner's Representative. All test samples shall be supplied by the Contractor at his own expense. Samples shall be obtained in accordance with the latest revisions of the American Society of Testing Materials (ASTM) Designations C190, C184, C114, C227, C183, C265 and C109 or relevant British Standards (BS) Specifications.

PART 2 MATERIALS

2.01 Concrete Materials

A. Portland Cement

Unless otherwise stated, the cement shall be ordinary Portland Cement for all works (as described in the Bills of Quantities) originating from approved manufacturers, and shall comply with the requirements of and satisfy the tests contained in BS 12 for ordinary Portland Cement, the American Association of State Highway and Transportation Officials (AASHTO) Specification M-85 "Portland Cement" and/or ASTM Designation C150.

B. Bulk Deliveries

Cement delivered in bulk shall be accepted only if a central mixing plant is used.

C. Bags and Markings

The cement shall be delivered to the site in the original sealed bags of 50 Kg. net or other containers of the manufacturer in batches not exceeding 100 tons. The name and brand of manufacturer shall be plainly marked on bags or other containers, all bags or other containers shall be in good conditions at the time of inspection.

The Contractor shall present to the Supervising Engineer/Owner's Representative an official certificate of the manufacturer concerning the specifications and quality of the different types of cement.

D. Storage Of Cement

All cement shall be stored in suitable, weatherproof buildings which will protect the cement from dampness. Provisions for storage shall be ample, and the consignment of cement as received shall be separately stored in such a manner as to provide easy access for the identification and inspection of each consignment.

Stored cement shall meet the test requirements at any time after storage, should a retest be ordered by the Supervising Engineer/Owner's Representative. Cement shall be used in the order of delivery.

The Contractor shall keep accurate records of the deliveries of cement and of its use in the works. Copies of these records shall be supplied to the Supervising Engineer/Owner's Representative in such form as may be required.

2.01 Concrete Materials (cont'd)

E. Inspection

The Supervising Engineer/Owner's Representative shall be given every facility for sampling and inspection of the cement on and off the site.

The Contractor shall notify the Supervising Engineer/Owner's Representative of the dates of delivery so that there will be sufficient time for sampling the cement upon delivery.

F. Rejection

The cement shall be rejected if it fails to meet any of the requirements of these specifications

1. Packages varying by 5 percent or more from the specified weight shall be rejected and if the average weight of packages in any consignment, as shown by weighing 50 Kg. bags taken at random, is less than that specified, the entire consignment shall be rejected and the Contractor shall remove it and replace it with cement of satisfactory quality.

2. The provisional acceptance of the cement on site shall not deprive the Supervising Engineer/Owner's Representative of the right to reject or retest for soundness at any time.

3. No cement shall be used from any one batch until the result of the tests on that batch are known to be satisfactory. Any batch failing to pass the test shall be immediately removed from the site.

2.02 Aggregates Generally

A. General

The aggregate shall be selected and graded to produce a dense concrete free from voids and of good workability without requiring an excessive amount of water. Where necessary, and at no extra cost to the Owner the aggregates shall be washed and/or sieved until they comply with the requirements of BS 882 "Coarse and Fine Aggregate from Natural Sources for Concrete", and these specifications -

1. Gap-graded aggregates shall not be acceptable.

2. All aggregates shall consist of tough, hard, durable and uncoated particles. Approval of aggregate quality and/or gradation shall not waive the responsibility of the Contractor to produce concrete to the strength specified.

2.02 Aggregates Generally

B. Care and Storage of Concrete Aggregates

Aggregates stock piles shall be built up and removed in layers not exceeding one meter in thickness on hard and clean surfaces with not more than 5 percent slope. The center of the storage area shall be elevated and slightly sloped to the sides in order to provide proper drainage of excess moisture.

Aggregate which has become segregated or contaminated with foreign matter during storage or handling will be rejected and shall be removed and replaced with material of acceptable quality at the Contractor's expense.

Aggregate shall be stored in sufficient quantity to ensure that shortage is not the cause of interruption of concreting works at any time.

2.03 Fine Aggregates

A. General

All fine aggregate for concrete shall conform to the AASHTO Specification M-6 "Fine Aggregate for Portland Cement Concrete", and/or BS 882 "Coarse and Fine Aggregate from Natural Sources for Concrete".

Fine aggregate shall consist of natural sand having hard, strong, durable particles. It shall not contain harmful materials such as iron pyrites, coal, mica, shale, alkali, coated grains or similar laminated materials which may attack the reinforcement in such a way or in sufficient quantity to affect adversely the strength and durability of the concrete. The fine aggregate shall at no cost to the Owner be washed and sieved as required to remove deleterious substances.

Fine aggregate from different sources of supply shall not be mixed or stored in the same pile nor used alternately in the same class of construction mix.

B. Soundness

When the fine aggregate is subjected to five alternations of the sodium sulfate soundness test, the loss of weight shall not exceed 10 percent by weight.

C. Organic Impurities

All fine aggregate shall be free from injurious amounts of organic impurities and when subjected to the calorimetric test for organic impurities and producing a color darker than the standard, they shall be rejected unless they pass the mortar strength test.

Should the aggregate show a darker color than that of samples originally approved for the works, its use shall be withheld until tests satisfactory to the Supervising Engineer/Owner’s Representative have been made to determine whether the increased color is indicative of an injurious amount of deleterious substances.

2.03 Fine Aggregates (Cont'd)

D. Grading

Fine aggregate shall be well and uniformly graded from coarse to fine, and shall be approved by the Supervising Engineer/Owner's Representative.

In particular, the maximum percentage by weight passing a No. 52 BS sieve or a No. 100 ASTM (0.1 mm.) sieve shall not exceed 5 percent of the total weight of fine aggregate.

Fine aggregate of the maximum percentage by weight passing a No. 100 British Standards sieve shall not exceed 10 percent.

2.04 Coarse Aggregates

A. General

All coarse aggregate for concrete shall conform to the AASHTO Specifications M-80 "Coarse Aggregate for Portland Cement Concrete" or BS Specifications 882 "Coarse and Fine Aggregate from Natural Sources for Concrete". Coarse aggregate shall consist of gravel, crushed gravel or crushed stone having hard, strong and durable pieces which are non-adherent. It shall not contain harmful materials such as iron pyrites, coal, mica, laminated materials or any materials which may attack the reinforcement in such a way or in sufficient quantity to affect adversely the strength and durability of the concrete. If necessary, coarse aggregate shall at no extra cost to the Owner be washed to remove deleterious substances.

B. Deleterious Substances

The total amount of deleterious substances shall not exceed 3 percent by weight of coarse aggregate.

C. Percentage Of Wear

Coarse aggregate shall conform to the following requirements

- Amount of wear, Los Angles test

Not more than 35 percent over 500 revolutions at approximately 30 revolutions a minute.

D. Soundness

When a coarse aggregate is subjected to five alternations of the sodium soundness test, the loss by weight shall not exceed 10 percent.

Coarse aggregates failing to meet the requirements given in the previous paragraph may, at the option of the Supervising Engineer/Owner's Representative be subjected to an alternative freezing and thawing test.

The requirements for soundness given above may be waived by the Supervising Engineer/Owner's Representative, in the case of aggregate for use in structures or portion of structures not exposed to weathering.

E. Grading

Coarse aggregate shall be well and uniformly graded and shall be approved by the Supervising Engineer/Owner's Representative.

2.05 Light Weight Aggregates

A. General

All light weight aggregate for concrete shall conform to BS 3797 Part 2 "Light weight Aggregates for Concrete".

B. Grading

Light weight aggregate shall be well and uniformly graded and shall be approved by the Supervising Engineer/Owner's Representative.

Combined Aggregates

Approved fine and coarse aggregate in each batch of concrete shall be combined in proportion as approved by the Supervising Engineer/Owner's Representative according to test results giving the required compressive concrete stress as specified per type of concrete.

Special combined aggregate gradation shall be used for concrete members with reinforcement too close to permit proper gradation to another, this shall not be made during the progress of the works unless approved by the Supervising Engineer/Owner's Representative. Such changes will be admitted only after satisfactory test results.

2.06 Sand for Mortar

A. General

Sand used for mortar shall be from an approved source and shall pass a No. 7 B.S.S. Sieve with no more than 10 percent passing a No. 100 B.S.S Sieve and shall consist of hard, strong, durable uncoated mineral or rock particles, free from injurious amounts of organic or other deleterious substances.

B. Organic Impurities

Fine aggregate for mortar when subjected to the calorimetric test for organic impurities and producing a color darker than the standard color shall be rejected.

C. Grading

Sand for mortar shall be uniformly graded from fine to coarse and shall be approved by the Supervising Engineer/Owner's Representative.

2.07 Water

Water should comply with the requirements BS 5328.

2.08 Admixtures

A. General

1. Admixtures to concrete or mortar shall be used only when approved by the Supervising Engineer/Owner's Representative and shall conform to the requirements to the AASHTO Specifications M-194 "Chemical Admixtures for Concrete" of ASTM Designation C949; Type D Water Reducing and Retarding Admixtures; or BS 5075, Part 1, 2 and 3 'Concrete Admixtures'.
2. Approved water reducing and retarding admixture from an approved manufacturer shall be used in the concrete of the raft foundation.
3. The admixtures shall be stored in such a manner as to permit easy access for proper inspection and identification for each shipment and in a suitable weather-tight building that will protect the admixtures from dampness.
4. Admixture for concrete work shall be liquid form, super plasticizer as. Costs of such admixtures, sampling and testing shall be borne by the Contractor.

B. Tests

The Contractor shall ensure that the admixture supplied for use in the work must be the same as the admixture subjected to test under this Specification. Test on admixtures shall be made whenever practicable, using the cement, aggregates and water proposed for the specific work because the effects produced by chemical admixtures may vary with the properties of the other ingredients of the concrete.

C. Types of Admixtures

Water reducing and retarding admixtures shall be approved in writing by the Supervising Engineer/Owner's Representative before use.

Where concrete is required to be waterproofed, the Contractor shall use approved admixtures subject to the requirements of the Specifications.

Admixtures that contain relatively large amounts of chloride accelerating corrosion of reinforcing steel shall not be used without the approval of the Supervising Engineer/Owner's Representative.

D. Chloride ion content in admixtures is not to exceed 2% by weight of admixture or 0.03% by weight of cement in mix.

E. Total chloride content in concrete mix arising from constituents and other sources is not to exceed the following percentage of chloride ion to cement by weight -

- concrete made with sulphate resisting cement 0.15%
- Concrete containing embedded metal and made with ordinary Portland cement 0.30% for 95% of test results with no results greater than 0.50%

F. Total sulphate content in concrete mix arising from constituents and other sources is not to exceed the lesser of 0.4% by weight of aggregates or 3.7% by weight of cement in mix

2.09 Acceptable Suppliers

A. The Contractor shall submit to the Supervising Engineer/Owner's Representative the names of three sub-contractors/suppliers and their products which will be acceptable under this section. Approval of the sub-contractor/supplier or product must be obtained before proceedings with associated work.

2.10 Accessories

A. Non-shrink Grout premixed compound consisting of non- metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 17 MPa in 2 days and 48 MPa in 28 days.

2.11 Concrete Mixes

A. Mix concrete in accordance with BS 5328.

Concrete mixing shall be made in conformity to the requirements outlined in the foregoing sections for concrete material, on the other sections pertaining to controlling temperature, and on the mixes properties outlined in the following table. The concrete production shall also comply with the recommendations of the Jordanian specifications.

B. The following table gives general guidelines on the constituents of different mixes to be produced

Trial mixes to be made by the Contractor to establish mix design for all the concrete types.

Concrete Grade	Minimum Cement Content	Maximum Size Of Aggregate	Maximum Free Water Cement Ratio	Characteristic Cube Strength Mpa		Slump
	kg/m^3	S(mm)		at 7day	at 28days	(mm)
35	350	20	0.55	20	30	75
25	300	20	0.6	15	25	75
15	200	20	0.70	10	15	100-150

Note: When using admixtures SLUMP will vary and will be determined as per the trial mix design

C. Three (3) concrete standard test cubes will be taken for every 50 or less cubic meters of concrete placed.

D. Three (3) additional standard test cubes will be taken during either hot or cold weather concreting and be cured under same conditions as the concrete it represents.

E. One (1) slump test will be taken for each set of test cubes taken.

F. The Contractor shall use for the composition of the concrete three different uniform ranges of aggregates, one for fine aggregates and two for coarse aggregates. The Contractor shall obtain the approval of the Supervising Engineer/Owner's Representative in determining the extreme limits of each aggregate range based on laboratory results of the trial mixes, presented by the Contractor and specified in the clause "Proportions of Constituents of Concrete".

2.12 Proportions of Constituents of Concrete

A. General

In general, the least amount of fine aggregate which will ensure concrete of the required workability for the placing conditions involved should be used. Any change in weight of fine aggregate made by the Contractor for the purposes of adjusting workability must be compensated for by a corresponding change in weight of coarse aggregate in the opposite direction. After the materials provided by the Contractor have been accepted for the works, the proportions and equivalent batch weight shall be determined which will produce concrete having not less than the strength required.

All adjustments in the proportions of the constituents of the concrete shall be approved by the Supervising Engineer/Owner's Representative before use in the works.

B. Trial Mixes

The actual proportions shall be determined on the basis of trial mixes made by the Contractor and conducted with the content being determined by means of yield test in accordance with AASHTO Specifications T-121 or ASTM Designation C138.

Immediately upon award of Contract, the Contractor shall make trial mixes in adequate number of specimens as per the relevant standards and in accordance with the description set forth in the General Specifications.

From the results of tests made on the Specimens, Contractor shall propose the mix design of each of the concrete grades listed in the tabulation referred to in sub article 2.11 -B.

The proportions will be such as to obtain (within a tolerance of plus or minus 1 percent) the cement content shown in the table of composition of concrete. However, if the materials supplied by the Contractor are of such a nature or are so graded that proportions based on the minimum cement content cannot be used without exceeding the maximum allowable water content specified in the table, then the proportions will be adjusted so as to require the least amount of cement which will produce concrete at the suitable plasticity and workability content. No compensation will be made for the increased quantity of cement required.

C. Designation of Mixes

The mixes required will be designated and recorded in (a) kilograms of fine and coarse aggregates excluding free water, per 50 Kg of cement and in (b) liters of total mixing water per 50 Kg of cement related to the amount of cement required per cubic meter of concrete. These proportions shall not be changed during the progress of the work except as provided for below.

2.12 Proportions of Constituents Of Concrete (cont'd)

D. Batch Weights

Since the proportions are designated in terms of aggregate in surface dry conditions, the equivalent batch weights to be used in the works shall be corrected periodically to take into account the actual moisture content of the aggregates at the time of use.

E. Adjustment During the Progress of The Works

No adjustment shall be permitted which results in concrete of a lesser compressive strength than those specified under "Composition of Concrete" for each grade of concrete.

After the original proportions have been designated, as prescribed above, these proportions shall not be changed during the progress of the work except as follows:

I. Adjustment for Variation in Workability

If it is found impossible to obtain concrete of a suitable plasticity and workability with the proportions originally designated, the Contractor may change the specified proportions. Such changes shall be based on actual test results, provided that in no case shall the amount of cement originally designated be decreased.

II. Adjustment for Variation in Yield

If the cement content of the concrete, determined by means of yield tests in AASHTO Specifications T-121 or ASTM Designation C138, varies more than 1 percent from the designated value, the proportions shall be adjusted so as to bring the cement to within 1 percent of designated value.

III. Adjustment for Minimum Strength

If it is found impossible to produce concrete, having the minimum allowable compressive strength as specified, the cement content shall be increased as directed by the Supervising Engineer/Owner's Representative.

IV. Adjustment for Change of Materials

No change in the source or properties of the materials shall be made without due notice to the Supervising Engineer/Owner's Representative and no new materials shall be used until the Supervising Engineer/Owner's Representative has accepted them and new proportions based on test trials have been determined.

2.12 Proportions of Constituents of Concrete (cont'd)

Should any of the above-mentioned changes require an increase in the minimum quantity of cement specified, no additional compensation will be made to the Contractor.

2.13 Measurements of Materials

A. General

All measuring devices shall be subject to approval by the Supervising Engineer/Owner's Representative.

Materials shall be measured by weighing, except as otherwise specified or where other methods are specifically authorized by the Supervising Engineer/Owner's Representative. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. Each size of aggregate and the cement shall be weighed separately. The accuracy of all weighing devices shall be such that successive quantities can be measured to within 1 percent of the desired amount. Cement in standard bags need not be weighed.

B. Measurement of Water

The mixing water shall be measured by volume or by weight. The water measuring device shall be susceptible to control accuracy of plus or minus half percent of the capacity of the tank.

C. Volumetric Measurements

Where volumetric measurements are exceptionally authorized by the Supervising Engineer/Owner's Representative, the weight proportions shall be converted to equivalent volumetric proportions. In such cases, suitable allowance shall be made for variations in the moisture conditions of the aggregate, including the bulking effect in the fine aggregate.

2.14 Mixing of Concrete

A. General

Concrete shall generally be machine mixed.

All materials shall be accurately measured in accordance with the terms of 'Measurement of Materials'.

The mixing of concrete or mortar shall not be permitted when the temperature is above 40 ^{O}C or less than 2^{O}C.

2.14 Mixing of Concrete (cont'd)

B. Equipment

All mixing machines, wheel barrows, vessels, platforms, tools and other equipment used for mixing, transportation or placing concrete shall be kept clean at all times. All shall be thoroughly cleaned before using a different type of cement. Mixing machines which have been out of use for more than twenty minutes shall be thoroughly cleaned out before any fresh concrete is mixed in them.

C. Hand Mixing

In certain cases, i.e. small works or for mortar, mixing by hand will be determined on application to the Supervising Engineer/Owner's Representative. In this event the aggregates shall be spread on a clean and dry concrete, metal or boarded surface and the cement spread over. The whole of the materials being added through a rose to ensure that the materials cling together. In all cases where hand mixing is permitted the amount of cement shall be increased by 10 percent at the Contractor's own expense.

D. Mixing At Site

Should the Contractor use mixing at site (for minor structural items) then the Contractor shall at his own cost provide a rented site adjacent to the project site for erecting his Batch Mixer, and for storing all materials to be incorporated in the Project work.

Concrete shall be thoroughly mixed in a batch mixer of an approved size and type which will ensure a uniform distribution of the materials throughout the mass.

The mixer shall be equipped with adequate water storage and device for accurately measuring and automatically controlling the amount of water used in each batch. Mechanical means shall be provided for recording the number of revolutions for each batch and automatically preventing the discharge of the mixer until the materials have been mixed for the specified number of revolutions and/or minimum time.

All concrete shall be mixed for a period of not less than 75 seconds after all materials have been introduced to the mixer and discharged as prescribed in AASHTO Specifications T-126. During the period of mixing, the mixer shall operate at a speed of not less than 14 and not more than 20 revolutions per minute.

The first batch of materials for concrete placed in the mixer shall contain a sufficient excess of cement, sand and water to coat the inside of the drum to avoid reducing the required content of these materials for subsequent mixes. Upon cessation of mixing for an appropriate period, the mixer shall be thoroughly cleaned.

2.14 Mixing of Concrete (cont'd)

E. Truck Mixing

Truck mixers shall be of the revolving drum type, water tight and so constructed that the concrete can be mixed to ensure a uniform distribution of materials throughout the mass. Materials for the concrete shall be charged into the drum at the proportioning plant. Except as subsequently provided, the truck mixer shall be equipped with a tank for carrying mixing water.

Only the prescribed amount of water shall be placed in the tank unless the tank is equipped with a device by which the quantity of water added to the batch can be readily verified. Truck mixers shall be provided with means by which the mixing time can be readily verified by the Supervising Engineer/Owner's Representative.

Mixing shall begin within 30 minutes after the cement has been added to the aggregate. When cement is charged into a mixer drum containing surface-wet aggregate and when the temperature is above 33 degrees C, this limit shall be reduced to 15 minutes. The limitation or time between the introduction of the cement to the aggregate and the beginning of the mixing may be waived when in the judgment of the Supervising Engineer/Owner's Representative the aggregates are sufficiently free from moisture.

F. Partial Mixing at the Central Plant

When a truck mixer is used for transportation, the mixing time at the mixing plant may be reduced to 30 seconds and the mixing completed in the truck mixer. The mixing time in the truck mixer shall be as specified under "d" 'Mixing at Site' above.

When truck mixers are used, water must only be added when trucks reach the construction site.

G. Plant Mix

Mixing at a central plant shall conform to the requirements for "Mixing at Site' and to the AASHTO Specifications M-157.

H. Time of Hauling and Placing Concrete

Concrete transported in a truck mixer shall be discharged at the job and placed in its final position in the forms within 30 minutes after water is first added to the mix.

2.14 Mixing of Concrete (cont'd)

i) Delivery

The rate of delivery of concrete during concreting operations shall be such as to provide for the proper handling, placing and finishing of the concrete. The rate shall be such that the interval between batches shall not exceed 20 minutes and the methods of delivering and handling the concrete shall be such as to allow placing without re-handling and without damage to the structure or the concrete.

j) Re-tempering

The concrete shall be mixed only in such quantities as are required for immediate use and any concrete which has developed initial set shall not be used. Concrete which has partially hardened shall not be re-tempered or remixed.

PART 3 EXECUTION

3.01 Handling & Placing of Concrete

A. General

1. Concreting shall be discontinued when the temperature is less than 4 degrees C. and more than 40 degrees C. Conform to ACI 305 and ACI 306 when concreting in hot and cold weather respectively.

2. Place concrete in accordance with BS 8110.

3. Notify the Supervising Engineer/Owner's Representative minimum 24 hours prior to commencement of concreting operations.

4. Ensure anchors, seats, plates, and other items to be cast into concrete are placed, held securely, and will not cause hardship in placing concrete. Rectify same and proceed with work.

5. Coordinate with the Electro-Mechanical Contractor the positioning and installation of all sleeves, inserts and other items to be cast into concrete are installed prior to closing the formwork and/or casting of the concrete. (in coordination with designer and site Engineer)

6. Maintain records of poured concrete items, in an approved form, details of every pour of concrete placed in the permanent works including

   * Class of concrete.
   * Location and date of pour.
   * Ambient temperature and concrete temperature at time of placing.
   * Moisture content of aggregates.
   * Details of mixes, batch numbers and cement batch number.
   * Results of tests.
   * Location of test cube sample point.

3.01 Handling & Placing of Concrete (cont'd)

7. Weekly records provide four copies of records each week covering work carried preceding week.

8. Monthly records provide monthly histograms of all 28 day cube strength and both monthly and accumulative standard deviations and other information which the Supervising Engineer/Owner's Representative may require concerning concrete placed in the permanent works.

9. Transport concrete to avoid contamination, segregation or less of ingredients.

10. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.

11. Prepare previously placed concrete by cleaning to the Supervising Engineer/Owner's Representative's satisfaction as detailed under sub-clause 3.17-h.

12. Pour concrete continuously between predetermined construction and control joints.

13. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify the Supervising Engineer/Owner's Representative upon discovery.

14. Maintain concrete cover around reinforcing as noted on structural drawings.

    A. Special precautions shall be taken during concreting in temperatures greater than 32 degree C. in respect of the cooling of aggregates, maintenance of the correct water/cement ratios and the proper carrying out of the work. The approval of the Supervising Engineer/Owner's Representative shall be obtained for concreting above these conditions.

    B. Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcement. The use of long troughs, chutes and pipes for conveying concrete from the mixer to the forms shall be permitted only upon the authorization in writing of the Supervising Engineer/Owner's Representative. If inferior quality of concrete is produced by the use of such conveyors, the Supervising Engineer/Owner's Representative may order discontinuance of their use and the substitution of a satisfactory method of placing.

    C. In the case of small sections of concrete, the Supervising at Engineer/Owner's Representative may his discretion order the by Contractor to consolidate the concrete means of hand punning instead of vibration.

15. Casting bays allow not less than 48 hours between casting of adjacent bays separated by construction joints or formed contraction joints.

16. Expansion Joints do not place concrete on both sides of joint at same time unless otherwise approved.

3.01 Handling & Placing of Concrete (cont'd)

B. Concreting In Cold Weather

1- Aggregates, water, formwork and reinforcement must always be free from ice, snow or frost for the production and placing of concrete.

2- The Contractor shall keep on site an accurate minimum-maximum thermometer suitably positioned to represent the environment in which concrete is being placed and shall keep daily records of the minimum and maximum temperatures.

3- No concrete shall be placed when the air temperature is less 3 degrees C. on a falling thermometer or 6 degrees C. on a rising thermometer without the permission of the Supervising Engineer/Owner's Representative.

4- In the event of the Supervising Engineer/Owner's Representative giving such permission, the following shall apply-

- Concreting shall be at the sole risk of the Contractor and shall be carried out during the day only.
- The Contractor shall take the precautions described in BS 8110 Section 6.7 including the making of test cubes cured under the same conditions as the concrete.
- Any concrete damaged by frost shall be removed.

C. Preparation Of Formwork

In preparation for the placing of concrete, all sawdust, chips and other construction debris and extraneous matter shall be removed from the interior of forms, struts, stays and braces serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete shall be removed when the concrete placing has reached a level rendering their service unnecessary.

These temporary members shall be entirely removed from the forms and not buried in the concrete.

D. Chutes, Troughs and Pipes

Open troughs and chutes shall be of metal or metal lined. Where steep slopes are required, the chutes shall not be less than one vertical to two horizontal units.

All chutes, troughs and pipes shall be kept clean and free from coatings or hardened concrete by thoroughly flushing with water after each run. Water used for flushing shall be discharged clear of the structure.

3.01 Handling & Placing of Concrete (cont'd)

E. Depositing

When placing operations would involve dropping the concrete more than 1.5 m., it shall be deposited through sheet metal or other approved pipes. As far as practicable, the pipes shall be kept full of concrete during placing and their lower ends shall be kept buried in the newly placed concrete. After the initial set of the concrete, the forms shall not be jarred and no strain shall be placed on the ends of reinforcement bars which project.

F. Compacting

Concrete, during and immediately after depositing, shall be thoroughly compacted. The compaction shall be done by mechanical vibration subject to the following provisions.

1- The vibration shall be internal unless special authorization of other methods is given by the Supervising Engineer/Owner's Representative or as provided herein.

2- Vibrators shall be of a type and design approved by the Supervising Engineer/Owner's Representative. They shall be capable of transmitting vibrations to the concrete at frequencies of not less than 4500 impulses per minute.

3- The intensity of vibration shall be such as to visibly affect a mass of concrete of 2.5 cm. slump over a radius of at least 45 cm.

4- The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the forms.

5- Vibrators shall be manipulated so as to thoroughly work the concrete around the reinforcement and embedded fixtures and into the corners and angles of the forms.

6- Vibrators shall be applied at the point of deposit and in the areas of freshly deposited concrete. The vibrators shall be inserted and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete, but shall not be continued so as to cause segregation, vibration shall not be continued at any one point to the extent that localized areas of grout are formed.

7- Application of vibrators shall be at points uniformly spaced and not further apart than twice the radius over which the vibrator visibly affects the concrete.

8- Vibrations shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the forms over distances so great as to cause segregation and vibrators shall not be used to transport concrete in the forms.

3.01 Handling & Placing of Concrete (cont'd)

9- Vibrators shall be supplemented by such spading as is necessary to ensure smooth surfaces and dense concrete along form surfaces and in corners and locations impossible to reach with the vibrators.

10- The use of implements such as compressors which are likely to disturb or disarrange reinforcement shall not be permitted.

G. Concrete Layers

Concrete shall be placed in horizontal layers not more than 30 cm. thick except as hereinafter provided. When less than a complete layer is placed in one operation, it shall be terminated in a vertical bulkhead.

Each layer shall be placed and compacted before the preceding batch has taken initial set to prevent injury to the green concrete and avoid surfaces of separation between the batches. Each layer shall be compacted so as to avoid the formation of a construction joint with the preceding layer which has not taken initial set.

H. Discontinuance Of Concrete

When placing of concrete is temporarily discontinued, the concrete after becoming firm enough to retain its form shall be cleaned of laitance and other objectionable materials to a sufficient depth to expose sound concrete. To avoid visible joints as far as possible upon exposed faces the top surface of the concrete adjacent to the forms shall be smoothed with a trowel.

Immediately following an approved discontinuation of placing concrete, all accumulations or mortar splashed upon the reinforcement bars and the surfaces of forms shall be removed. Dried mortar chips and dust shall not be puddled into the unset concrete. If the accumulations are removed prior to the concrete becoming set, care shall be exercised not to injure or break the concrete steel bond at and near the surface of the concrete while cleaning the reinforcement bars.

3.02 Construction Joints

Keyed Construction joints shall be made only where located on the approved shop drawings. In the case of emergency, construction joints shall be placed as directed by the Supervising Engineer/Owner's Representative. Shear keys or inclined reinforcement shall be used where necessary to transmit shear or bond the two sections together, pending the Supervising Engineer/Owner's Representative approval.
Before depositing new concrete on or against concrete which has hardened, the form shall be retightened. The surface of the hardened concrete shall be roughened as required by the Supervising Engineer/Owner's Representative in a manner that will not leave loosened particles of aggregate or damaged concrete at the surface.

3.02 Construction Joints (cont'd)

It shall be thoroughly cleaned of foreign matter and laitance and saturated with water. To ensure an excess of mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surfaces, including vertical and inclined surfaces shall first be thoroughly covered with a coating of mortar or neat cement grout against which the new concrete shall be placed before the grout has attained its initial set.

The placing of concrete shall be carried continuously from joint to joint. The face edges of all joints which are exposed to view shall be carefully finished to line and elevation.

3.03 Construction Joints in Reinforced Concrete Walls

Reinforced concrete walls shall be poured in sections not exceeding 15 meters in length. The height being from slab to slab.

3.04 Blinding Concrete

Thickness shall be as shown on the drawings. Blinding concrete shall be used under all structural slabs, beams and reinforced concrete footings.

3.05 Conform to ACI 305 When Concreting During Hot Weather.

3.06 Conform to ACI 306 When Concreting During Cold Weather.

3.07 Separate Floor Toppings

A. Place concrete floor toppings to required lines and levels.

B. Prior to placing remove deleterious material. Broom and vacuum clean. Place required dividers edge strips reinforcing and other items to be cast in.

3.08 Screeding

A. Screed floors slabs-on-fill and concrete base for toppings level, maintaining surface flatness of maximum 2 mm/m.

The design mix must first be tested and approved by the Supervising Engineer/Owner’s Representative prior to commencement of the actual screeding work.

The concrete surface to be screeded shall be thoroughly cleaned to the Supervising Engineer/Owner’s Representative's satisfaction, and then primed with an approved bonding coat.

Lay screed to a true flat surface and finish off trowelled smooth.

3.08 Screeding (cont'd)

B. Light weight cellular concrete screed to roof with dry density of 450 kg/cu.m and 1.4 Mpa compressive strength in accordance with ASTM C869, average thickness as indicated on the drawings with 20mm cement/sand (1:4) topping with a minimum thickness of 30mm at the drains and a minimum slope of 0.75%.

3.09 Patching

C. Allow the Engineer to inspect concrete surfaces immediately upon removal of forms. Patch imperfections as directed.

3.10 Defective Concrete

A. Modify or replace concrete not conforming to required lines, details and elevations.

B. Repair or replace concrete not properly placed resulting in excessive honeycombing and other defects. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of the Supervising Engineer/Owner's Representative for each individual area.

3.11 Concrete Finishing

A. Provide concrete surfaces to be left exposed as directed and in accordance with BS 8110.

3.12 Curing and Protection

A. Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

END OF SECTION

SECTION 03 39 00 CONCRETE CURING

PART 1 GENERAL

1.01 Scope of Work

A. Initial and final curing.

B. Curing materials.

1.02 Related Work

A. Section 03 30 00: Cast-in-Place Concrete.

B. Section 03 11 00: Concrete Forming.

1.03 References

A. ANSI A168.1 Practice for Curing Concrete

B. ACI 305 Recommended Practice for Hot Weather Concreting

C. ACI 306 Recommended Practice for Cold Weather Curing

D. ACI 308 - 71 Recommended Practice for Curing Concrete

PART 2 PRODUCTS

2.01 Materials

A. Water: Potable

B. Absorptive Mats Burlap: cloth made of jute or kenaf conforming to AASHTO M182 and minimum weight 0.29 Kg/m2.

C. Membrane Curing Compound: acrylic, or chlorinated rubber type, pigmented.

D. Polyethylene Film: 0.1 mm thick, clear color.

PART 3 EXECUTION

3.01 Curing water should be of a temperature compatible with concrete temperature and not more than 11 degree C cooler concrete surface.

3.02 Ponding

A. Maintain 100% coverage of water over slabs continuously for 5 days.

3.03 Spraying

A. Spray water over slabs and maintain wet for 5 days.

3.04 Absorptive Mat

A. Saturate burlap and place over exposed areas, lapping ends and sides minimum 50% over lap, and maintain in place saturated for 5 days.

3.05 Membrane Curing Compound

A. Apply curing compound in strict accordance with manufacturer's instructions.

END OF SECTION

DIVISION 4

MASONRY

Ref.	**Description**
040513	Masonry Mortaring
042000	Concrete Masonry Unit

SECTION 04 05 13 MASONRY MORTARING

PART 1 GENERAL

1.01 Scope of Work

A. Mortar for brick masonry and concrete masonry unit.

1.02 Related Work

A. Section 04 20 00 - Concrete Masonry Unit.

1.03 Quality Assurance

A. Perform work in accordance with requirements of BS 4551.

1.04 Reference Standards

A. BS 12 - Ordinary Portland Cement.

B. BS 890 - Building limes.

C. BS 882 - Aggregates from natural sources for concrete.

D. BS 4551 - Methods of testing mortars.

E. BS 4721 - Specification for ready-mixed building mortars.

E. Jordan General Specifications 1996.

1.05 Testing

A. Testing of mortar mix(es) will be performed by a firm appointed and paid for by the Contractor.

B. Provide free access to all portions of work and cooperate with appointed firm.

C. Submit proposed mortar mix design to testing firm for approval prior to commencement of work.

1.05 Testing (cont'd)

D. Tests of mortar mix(es) will be performed to ensure conformance with requirements stated herein and to ensure mortar will not produce efflorescence.

E. If mortar mix(es) do not conform with requirements stated herein, re-establish and re-submit for further testing. Pay costs for required retesting.

1.06 Submittals

A. Submit manufacturer's recommendations and product data in accordance with Section 01 33 00.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. The Contractor shall submit to the Supervising Engineer\Owner’s Representative the names of three manufacturers and their products which will be acceptable under this section. Approval of the manufacturer or product must be obtained before proceeding with associated work.

2.02 Mortar Materials

A. Portland Cement: BS12 Ordinary Portland Cement; grey color, refer to Section 03 30 00 - Clause 2.01, Item "A".

B. Aggregates: standard masonry type, BS 882, clean, dry and protected against dampness, freezing and foreign matter, refer to Section 03 30 00 - Clause 2.02, 2.03, 2.04 and 2.05.

C. Water: clean and free from injurious amounts of oil, alkali, organic matter or other deleterious material.

2.03 Admixtures

A. Plasticizer: water reducing type which reduces porosity and absorption to increase bond strength; as approved by the Supervising Engineer/Owner’s Representative refer to Section 03 30 00 - Clause 2.08.

2.04 Mortar Mix

A. Provide minimum 15 MPa mortar for non-load bearing walls and partitions.

PART 3 EXECUTION

3.01 Mixing Mortar

A. Thoroughly mix mortar ingredients, in quantities needed for immediate use.

B. Add mortar color and admixtures in accordance with manufacturer's recommendations. Ensure uniformity of mix and coloration (As necessary).

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. Use mortar within two hours of mixing at temperatures over (26 deg. C), and two and one half hours at temperatures under 10 degrees C.

E. If necessary, retemper mortar within two hours of mixing to replace water lost by evaporation. Do not retemper mortar after two hours of mixing.

END OF SECTION

SECTION 04 20 00 CONCRETE MASONRY UNIT

PART 1 GENERAL

1.01 Scope of Work

A. Concrete masonry unit walls; back-up for cavity walls, and interior partitions, complete with reinforcement and anchorages.

B. Concrete Lintels, bond beams and stiffener columns.

C. Form control joints.

D. Build-in items supplied by other Sections.

E. Cut and fit for other sections of work.

F. 70mm thick hollow concrete block for internal partitions

G. 100mm thick hollow concrete block for internal partitions.

H. 150mm thick hollow concrete block for internal partitions.

I. 200mm thick hollow concrete block for internal partitions.

1.02 Related Work

A. Section 04 05 13: Masonry Mortaring

1.03 Quality Assurance

A. Perform concrete masonry unit work in accordance with Supervising Engineer's / Owner Representative Instructions.

B. When requested by the Supervising Engineer / Owner Representative, provide evidence and test data confirming that concrete masonry units conform to standards stated herein.

1.04 Environmental Requirements

A. Maintain materials and surrounding air temperature to minimum (10 deg. C) prior to, during and 48 hours after completion of masonry work.

B. During freezing or near freezing weather, provide adequate equipment or cover to maintain a minimum temperature of (10 deg. C) and to protect masonry work completed or in progress

1.05 Protection

A. Maintain protective boards at exposed external corners which may be damaged by construction activities. Provide such protection without damaging completed work.

B. Keep expansion joint voids clear of mortar.

C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. The Contractor shall submit to the Supervising Engineer / Owner Representative the names of three manufacturers and their products which will be acceptable under this section. Approval of the manufacturer or product must be obtained before proceeding with associated work.

2.02 Masonry Units

A. Concrete Block: modular size(s) complete with corners, bases, bond beams, lintels and fillers to match and compliment block units, standard weight.

The compressive strength after 28 days shall be 3.50 MPa for partition blocks 7.00 MPa for bearing walls blocks.

2.03 Reinforcement and Anchorages

A. Reinforcing Steel for Bond Beams, Lintels and piers type as indicated by the Engineer and as specified.

B. Cavity Wall Horizontal Reinforcing: ladder type without moisture drip; galvanized steel construction; (5mm) side rods with 5mm cross ties at 400 mm centers as approved by the Engineer.

C. Anchors: Contractor to submit details for approval before start working.

D. Wall Ties: Contractor to submit details for approval before start working.

2.04 Concrete

A. Bond Beams, Lintels and Piers 25 MPa concrete at 28 days, 100mm slump.

B. Cement: Ordinary Portland cement grey color.

C. Coarse Aggregate: maximum (10 mm) size; 25% percent by volume.

D. Fine Aggregate: minimum .02mm size; 75% percent by volume.

2.05 Accessories

A. Control Joints: preformed neoprene material; as approved by the Supervising Engineer / Owner Representative.

B. Joint Filler: closed cell polyethylene oversized 50%; self-expanding; (25mm) wide x maximum lengths; as approved by the Supervising Engineer / Owner Representative.

PART 3 EXECUTIONS

3.01 Preparation

A. Supply metal anchors for placement. Provide in sufficient quantity and direct their correct placement.

B. Ensure items built-in by other trades for this work are properly located and sized.

C. Establish all lines, levels and coursing. Protect from disturbance.

3.02 Workmanship and Installation

A. Place concrete blocks in accordance with lines and levels indicated on drawings.

B. Fully bond external and internal corners and intersections.

C. Buttering corners of joints, deep or excessive furrowing of mortar joints is not permitted.

D. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.

E. Perform job site cutting with proper power tools to provide straight and true, unchipped edges.

F. Where non-bearing partitions extend to underside of floor, roof deck or structural system, stop masonry short 10 mm to 13 mm to allow for live load deflection. Fill gap with joint filler. Provide structural anchorage in accordance with General Specifications

G. Ensure masonry courses are of uniform height. Make vertical and horizontal joints equal and of uniform thickness.

H. Lay concrete block in full bed of mortar, properly jointed with other work.

3.02 Workmanship and Installation (cont'd)

A. Remove excess mortar and projections. Take care to prevent breaking block corners.

B. Lay concrete unit masonry in common bond. Course one (1) block unit and one (1) mortar joint to equal 210 mm.

C. Form concave mortar joints.

D. Cut mortar joints flush where damp proofing and waterproofing is scheduled.

3.03 Tolerances

A. Maximum variation from masonry unit to adjacent masonry unit to be (1 mm).

B. Maintain flush face on interior masonry surfaces.

3.04 Reinforcement and Anchorages

A. Place masonry reinforcing and anchorages for concrete unit masonry as follows:

1) Provide cavity walls with horizontal masonry reinforcing in every second block joint.

2) Place horizontal masonry reinforcing in first and second joints above and below openings. Place continuous in first and second joint below top of walls.

3) Fully reinforce corners and intersections.

4) Lap masonry reinforcing splices minimum 150mm. Extend minimum 400 mm each side of openings.

3.05 Lintels

A. Provide reinforced masonry lintels over openings, where steel lintels are not scheduled.

B. Construct lintels, using concrete and reinforcement specified. Maintain minimum 200 mm bearing on each side of opening. Contractor to submit details for approval.

C. Use reinforcing bars of full lengths only.

D. Place and consolidate concrete without disturbing reinforcement.

E. Allow lintels to reach maximum strength before removing temporary supports.

F. <u>Unless otherwise shown on the drawings, the lintels shall be reinforced as follows</u>:

2 Nos. 14mm diameter bottom bars.
2 Nos. 10mm diameter top bars.
Stirrups, 6mm diameter at 200mm spacing.

3.06 Bond Beams

A. Reinforce with 2 Nos. 10mm diameter top and bottom bars, and stirrups, 8mm diameter at 200mm spacing Lap splices 55 bars diameters Unless otherwise shown on the drawings.
B. Place and consolidate concrete without disturbing reinforcement.

3.07 Control Joints

A. Do not continue horizontal masonry reinforcing across control joints.

3.08 Built-in Work

A. As work progresses, build-in nailing strips, anchor bolts, plates, and other items supplied by other trades.

B. Build-in items plumb and true.

C. Bed anchors of timber and metal door frames in mortar joints. Fill masonry cores with grout minimum 300 mm from framed openings.

D. Do not build-in organic materials which will be subjected to rot or deterioration.

3.09 Cutting and Fitting

A. Cut and fit for chases, pipes, conduit sleeves and grounding. Cooperate fully with other sections of work to ensure correct size, shape and location.

B. Obtain the Supervising Engineer's / Owner Representative approval prior to cutting or fitting any area which is not indicated on drawings, or which may impair appearance or strength of masonry work.

3.10 Cleaning

A. Remove excess mortar and smears upon completion of masonry work.

B. Point or replace defective mortar. Match adjacent work.

C. Clean soiled surfaces using a non-acidic solution which will not harm masonry or adjacent materials. Use non-metallic tools in cleaning operations.

D. Leave surfaces disgnated to receive plaster, clean and ready to receive plaster work.

END OF SECTION

DIVISION 5
METALS

Ref.	Description
05500	Miscellaneous Metal Fabrications

SECTION 05500 MISCELLANEOUS METAL FABRICATIONS

PART 1 GENERAL

1.01 Work Included

A. Metal fabrications include items made from stainless steel, metal which are not a part of structural steel or other metal systems specified elsewhere.

B. Types of work, in this section include metal fabrications for the following, some of which are detailed on the structural and/or architectural drawings:

1) Strips

2) Signs and logo

1.02 Related Work:

03300 – Cast in place concrete

1.03 Quality Assurances:

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for timing and fitting where taking field measurements before fabrication might delay work.

B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.04 References

A. Applicable Publications The following publications of the issues listed below, but referred to thereafter by basic designation only form a part of this Section

1. Federal Specifications, Naval Publications and Forms Centre, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120, USA

   FF-W-92B Washers, Flat (Plain).

   RR-G-661E Grating, Metal, Bar Type (Floor, Except for Naval Vessels).

2. American National Standards Institute (ANSI), 1430 Broadway, New York, New York 10018, USA

1.04 References (Cont'd)

3. American Society for Testing and Materials (ASTM) Standards, 1916 Race Street, Philadelphia, Pennsylvania 19103, USA

   A27-83 Specifications for Steel Castings, Carbon, for General Application.

   A36-81a Specification for Structural Steel.

   A47-77 Specification for Malleable Iron Castings.

   A53-82 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

   A386-78 Specification for Zinc Coating (Hot-Dip) on assembled Steel Products.

   A569-72(1979) Specification of Steel, Carbon (0.15 Maximum, Percent), Hot Rolled Sheet and Strip, Commercial Quality.

   F593-82 Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

4. American Welding Society, Inc., (AWS), 2501 N.W. 7th Street, Miami, Florida 33125, USA
   D1.1-85 Structural Welding Code - Steel.

5. Military Specifications, Naval Publications and Forms Centre, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120, USA.

   MIL-P-21035A Paint, High Zinc Content, Galvanising Repair (Metric).

6. National Association of Architectural Metal Manufacturers (NAAMM), 221N. La Salle, Chicago, Illinois 60601, USA

   Metal Bar Grating Manual - October 1979

7. Steel Structures Painting Council (SSPC) ; 440Fifth Avenue, Pittsburgh, Pennsylvania 15213, USA

   PA1 Shop, Field & Maintenance Painting, November 1.1982.

   Paint 20 Zinc-Rich Primers (Type1-Inorganic and Type II - organic), November 1, 1982.

   SP3 Power Tool Cleaning, November 1, 1982.

1.05 Submittals

A. Product Data Submit Manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products.

B. Shop Drawings Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plan, elevations and details of sections and connections, Show anchorage and accessory items. Provide templates for anchor and bolt installation in critical area.

1. Where materials or fabrications are indicated to comply with certain requirement for design loading, include structural computations, material properties and other information needed for structural analysis.

C. Samples Submit the following samples

1) Fasteners Threaded; standard fasteners; or wedged type.

2) Bolts, nuts and washers Regular Hexagon head type washers, round, carbon steel.

3) Two pieces of floor bar gratings size as ordered by the Engineer.

4) Welding Materials AWS D1.1; type required for materials being welded.

PART 2 PRODUCTS

2.01 Materials

A. Ferrous Metals

1) Metal Surfaces, General For fabrication of miscellaneous metal work which will be exposed-to-view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

2) Steel Plates, Shapes and Bars ASTM A36.

3) Steel Bar Grating ASTM A569 or ASTM A36

4) Steel pipe ASTM a53; type and grade and as required for design loading; black finish; standards weight (Schedule 20), unless otherwise indicated.

5) Brackets, flanges and Anchors Cast or Formed metal of the same type material and finish as supported rails, unless otherwise indicated.

6) Concrete Inserts Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. provide bolts, washers and shims as required, hot -dip galvanized, ASTM A153.

B. Fasteners

1) Bolts and Nuts Regular hexagon head type, ASTM A307, Grade A.

2) Plain Washers Round, Carbon Steel, Federal Specification FF-W092.

C. Paint

All paint color shall be selected by Engineer

2.02 Fabrication, General

A. Workmanship

1) Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.

2) Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1 mm (1/32 inch), unless otherwise shown. From bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

3) Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces. Welding to or on structural steel shall be in accordance with the Structural Welding Code of the American welding Society.

4) Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (counter sunk) screws or bolts.

5) Prepare for anchorage of type indicated, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

6) Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

7) Galvanizing Furnish a zinc coating for those items shown or specified to be galvanized, as follows

a. ASTM A153 for galvanizing iron and steel hardware.

b. ASTM A123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 3mm (1/8-ich) thick and heavier.

c. ASTM A386 for galvanizing assembled steel products.

B. Surface Preparation Prepare ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications

1) Interiors (SSPC Zone 1A) SSPC-SP3 "Power Tool Cleaning"

PART 3 EXECUTION

3.01 Preparation

A. Field Measurements Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Co-ordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete construction. Co-ordinate delivery of such items to project site.

3.02 Installation

A. General

1) Fastening to In-Place Construction Install anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-lace construction; including, threaded fasteners for connectors as required.

2) Cutting, Fitting and Placement

a. Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Use temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.

b. Fit exposed connections accurately together to form tight hairline joints. Weld Connections which are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat.

3) Field welding Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

3.03 Adjust and Clean

A. Touch-Up Painting Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry-film thickness of Q5 mm (2.0 mils).

END OF SECTION

DIVISION 7

THERMAL AND MOISTURE PROTECTION

Ref.	Description
071110	Modified Bitumen Membrane Waterproofing
072100	Thermal Insulation

SECTION 07 11 10 MODIFIED BITUMEN MEMBRANE WATERPROOFING

PART 1 GENERAL

1.01 Work Included

A. Prepare, clean and repair surfaces.

B. Supply and apply primer and waterproofing membrane.

1.02 Related Work

A. Section 03 30 00: Cast-in-place concrete.

1.03 Shop Drawings And Product Data

A. Submit manufacturers instructions for the Engineer's review.

B. Submit shop drawings indicating waterproofing materials, protective covering, surface preparation and method of application for the Engineer's review and approval.

C. Indicated jointing details to large scale.

1.04 Warranty

A. Provide written warranties in the name of the Employer.

B. Warranty shall provide for making good, within a period of ten (10) years, at no cost to Employer, failures of waterproofing to resist penetration of water, except where such failures are result of structural failures of the building. Hairline cracking due to temperature of a shrinkage is not considered as structural failure. Repair and make good waterproofing membrane and pay for and repair or replace all affected or damaged materials surfaces at no cost to Employer.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. The Contractor shall submit to the Supervising Engineer / Owner Representative the names of three manufacturers and their products which will be acceptable under this section. Approval of the manufacturer or product must be obtained before proceeding with associated work.

2.02 Materials

A. Modified bitumen torchable membrane, 4mm thick, reinforced with 200 gm/m2 non-woven fabric spunbond polyester.

B. Primer compatible with waterproofing membrane and recommended by Manufacturer and approved by the Supervising Engineer/Owner's Representative.

C. Sealing mastic of type recommended by waterproofing manufacturer and approved by the Supervising Engineer/Owner's Representative.

PART 3 EXECUTION

3.01 Surface Preparation

A. Clean and prepare surfaces to receive waterproofing in accordance with manufacturers recommendations and the Engineer's acceptance and approved.

3.02 Application

The names of the application firm shall be approved by both the Engineer and the manufacturer prior to proceeding with the works.

A. All prepared surfaces shall when dry, be painted with a coat of primer at a rate recommended by waterproofing manufacturer. All blinding surfaces must be finished fair-faced or trowel smooth to receive the waterproofing membrane.

B. Apply the waterproofing membrane surface against prepared surfaces, in accordance with manufacturer's recommendations, ensuring that air is excluded from under membrane.

C. Adjacent rolls of waterproofing membrane should be provided with a minimum 150 mm lap and complete adhesion must be achieved between both layers to ensure complete waterproofing.

3.02 Application (cont'd)

D. All external and internal angles and corners shall be reinforced with an extra strip of waterproofing membrane, minimum 300 mm wide.

E. All internal corners should be provided with a 50 mm X 50 mm minimum fillet.

F. Where waterproofing membrane is to be terminated above ground level (150mm from G.L. or as instructed by the Engineer) a chase should be provided of minimum dimension 25 mm x 25 mm. The waterproof membrane should be dressed into the chase and immediately sealed as per the approved Shop Drawings.

G. Pipes and other projections through waterproof membrane should be properly treated with reinforcing strips, collars etc. as per manufacturer's recommendations to ensure complete waterproofing.

H. Where waterproof membrane is expected to be left exposed for any length of time the top edge should be batten-fixed to secure edge. The perimeter should be left with an extended edge for later continuity and the free edge shall be adequately protected while exposed. The free edge of the membrane should be carefully cleaned before further laying is commenced.

J. Before covering, inspect to ensure no damage. Any damaged area should be cleaned and patched in accordance with manufacturer's recommendations to ensure complete waterproofing.

K. On horizontal applications where steel reinforcement is to be fixed prior to concreting, the waterproof membrane should be protected in accordance with manufacturer's recommendations at the Contractor's own expense.

L. The area of waterproofing membrane laid in a working day should not exceed that which can be protected in the same working day, in order to ensure that membrane is not subjected to site traffic or damage.

M. Material having limited shelf life are to be supplied with labels indicating batch number and dates of manufacture and expiry. Materials not properly stored or which have exceeded their expiry date will not be permitted to be used in the work and are to be removed from the site.

N. Submit (10) ten years guarantee covering materials and workmanship of waterproofing system. The guarantee should be substantiated with a certified copy of the material guarantee provided by the manufacturer.

END OF SECTION

SECTION 07 21 00 THERMAL INSULATION

PART 1 GENERAL

1.01 Work Included

A. Prepare surfaces to receive insulation.

B. Rigid insulation and where applicable, as required to provide thermal barrier for building elements and spaces.

1.02 Reference Standards

A. ASTM-C518; ASTMD-1621; ASTMD-1622; ASTMD-2842.

1.03 Product Data

A. Submit manufacturers installation instructions for review by the Supervising Engineer\Owner's Representative.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. Saveto or equivalent

B. The Contractor shall submit to the Engineer the names of three Manufacturers/Suppliers and their products which will be acceptable under this Section. Approval of the Manufacturer or product must be obtained before proceeding with associated work.

2.02 Technical Data:

Description	Value
Thickness	50mm
Density(ASTMD-1622)	32Kg/m^3
Thermal Conductivity(ASTM C-518)	0.03W/mk
Compressive Strength(ASTMD-1621)	300 Kpa.
Water Absorption(ASTM D-2842)	<1%

2.03 Accessories

A. Vapour Barrier: Bituminous paint in two coats.

PART 3 EXECUTION

3.01 Workmanship

A. Install rigid insulation and vapor barrier to maintain continuous and complete thermal vapor protection for building spaces and elements.

B. Ensure surfaces which are to receive rigid insulation are clean, free of deleterious matter and are sufficiently level to allow proper installation of insulation.

C. Cut and trim insulation neatly to fit spaces. Butt edges and ends tight. Fit insulation tight against mechanical, electrical and other items which protrude through plane of insulation.

D. Use insulation free of broken or chipped edges and undamaged integral vapor barrier.

END OF SECTION

DIVISION 8
DOORS AND WINDOWS

Ref.	**Description**
08110	Steel Doors and Frames
08800	Glazing

SECTION 08110 STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 Work Included

A. Standard and fire rated type pressed steel hollow metal doors and panels and frames, with flush faces.

B. Standard louvered steel doors and screens.

C. Hardware for Class "A" labelled doors and panels.

D. Install hardware and louvers.

E. Paint.

1.02 Related Work

A. Section 08111: Standard Steel Frames.

B. Section 08700: Hardware.

C. Section 08800: Glazing.

1.03 Reference Standards

A. SDI-100: Recommended Specifications-Standard Steel Doors and Frames of Steel Door Institute.

B. Underwriters' Laboratories Inc.: (UL) or Warnok Hersey and Factory Manual (FM), as applicable to fire rated hollow metal doors.

C. ASTM A526: Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process, General Requirements.

D. ASTM A366: Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

1.04 Shop Drawings and Product Data

A. Submit shop drawings and product data in accordance with Section 01340.

B. Indicate general construction, configurations, jointing methods, reinforcements, and locations of cut-outs for louvers.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. The Contractor shall submit to the Supervising Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.

2.02 Fire Rated Doors

A. Fabricate fire rated hollow metal doors and panels of materials in accordance with requirements of Underwriters' Laboratories (UL). Place UL or Warnock Hersey labels where visible when installed in position.

B. Door Leaf: painted steel Gauge 18 door leaf, with 16-gauge steel sheet, galvanized stiffener every 19cm and rock wool.

C. Hardware: Consort or approved equal

2.04 Hardware

A. for Class "A" labelled doors.

B. Install butts on Class "A" labelled doors prior to delivery. Install in accordance with UL requirements.

2.05 Fabrication

A. Mechanically interlock longitudinal type doors and panels with rock wool insulations. Leave seams invisible, or weld, fill and grind smooth.

B. Reinforce and prepare doors and panels to receive hardware. Refer to Section 08700 for hardware requirements and schedules.

C. Fill surface depressions with metallic paste filler and grind to smooth uniform finish.

D. Touch up areas where coating has been removed due to sanding or handling.

E. Clean and apply one coat of primer.

F. Paint.

PART 3 EXECUTION

3.01 Installation

A. Install doors in accordance with SDI-100 except as amended in this Section.

B. Install hollow metal doors plumb and square, and with maximum diagonal distortion of 2 mm. Install hardware in accordance with requirements of Section 08700.

C. Installation of glass and glazing in door.

END OF SECTION

SECTION 08800 GLAZING

PART 1 GENERAL

1.01 Work Included

A. Glass and glazing for windows, handrails, and partitions.

1.02 Related Work

A. Section 08520 : Aluminum Windows and Doors.

1.03 Reference Standards

1- Glass Standard

A. ASTMC 1036 : Quality Q3 unless otherwise specified.

B. Head treated glass shall confirm to the requirements of ASTM C1048.

C. Tempered glass shall also confirm to ANSIZ97.1-984

D. All heat treating shall be by the horizontal process, and processed in such a manner as installed on the building.

E. FS DD-G-451C - Glass, Plate, Sheet, Figured (Flat, for Glazing, Mirrors and Other Uses).

F. FS TT-S-230A - Sealing Compound, Synthetic Rubber Base, Single Component, Chemical Curing for Caulking, Sealing and Glazing in Building Construction.

G. FS TT-S-001543 - Sealing Compound, Silicon Base (For Caulking and Glazing in Buildings and Other Structures).

2- Insulating glass standards

H. Laminated glass shall comply to ASTMC1172

J. Insulating glass comply to the following standards:

1. E773 test method for seal durability of sealed insulating glass units.
2. E774 specification for seal insulating glass units.
3. E546 test method for frost point of sealed insulating glass unit.
4. E576 test method for dew / frost of sealed insulating glass units vertical position.

1.04 Guarantee/Warranty

A. Provide written guarantee in accordance with Conditions of Contract, in the name of the project.

B. Provide Ten (10) years warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same for double glazing unit and (5) years on the laminated glass.

C. Original glass certificate of origin and 10 years warranty on the reflective and low-E coating from the glass agent should be submitted by the name of the project upon the completion.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. the Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.

C. Mechanical Connections must be provided, designed to integrate the wall assembly. These must be manufactured from materials wholly compatible with glass and able to cope with and distribute the constant stress applied.

2.03 Glazing Compounds

A. Glazing Compound: Modified oil type; colour to match aluminum framing sections.

B. Silicon compound for all joints of glass walls or approved equal.

C. Sealants.

2.04 Glazing Accessories

A. Setting Blocks: Neoprene; 80-90 Shore A durometer hardness; 9.5 mm long x width of glazing rabbet space minus 1.5mm x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene; 50 to 60 Shore A durometer hardness; 76 mm long x one half the height of the glazing stops x thickness to suit application.

C. Glazing Splines: Manufacturer's standard dry glazing splines to suit aluminum extrusions.

D. Glazing Tape: Preformed butyl type; NAMM #SS-1B-68, with integral spacing devices; Manufacturer's Standard size and colour; 10-15 shore A durometer hardness.

PART 3 EXECUTION

3.01 Exterior Dry Method (Preformed Glazing Channel)

A. Clean contact surfaces with solvent and wipe dry.

B. Cut glazing spline to proper length and install on glass pane. Weld joints by butting channel and dabbing with sealant.

C. Place setting blocks at 1/4 points with edge block no more than 150mm from corners.

D. Rest glass on setting blocks, and push against stop with sufficient pressure to ensure full contact and adhesion at perimeter.

E. Install removable stops, avoid displacement of glazing Spline, exert pressure for full continuous contact.

3.02 Interior Dry Method (Tape and Tape)

A. Cut glazing tape to length and install against permanent stop, projecting 1.6 mm above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 150mm from corners.

C. Rest glass on setting blocks and push against tape for full contact at perimeter of pane or unit.

D. Place glazing tape on free perimeter of glass in same manner described above.

E. Install removable stop, avoid displacement of tape, exert pressure on tape for full continuous contact.

F. Knife trim excess or protruding tape.

G. Glass walls are a specialist item. Installation must be carried out by trained experts in accordance with approved procedures. The walls must be supplied and installed under one contract accompanied by a ten-year warranty for both material and installation.

3.03 Cleaning

A. After installation mark glass with X by using tape or removable paste.

B. Immediately remove droppings from finished surfaces. Remove labels after work is completed.

END OF SECTION

SECTION 088300 MIRRORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 Related Work:

1. Division 8 Section "Hollow Metal Doors and Frames" for frame for observation mirror.

2. Division 10 Section "Toilet, Bath and Laundry Accessories" for metal-framed mirrors.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

2. Mirror hardware.

B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.

C. Samples: For each type of mirror product required, in the form indicated below:

1. Mirrors, 12 inches square including edge treatment on 2 adjoining edges.

2. Mirror trim, 12 inches long.

D. Product Certificates: For each type of mirror, signed by product manufacturer.

E. Qualification Data: For Installer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from condensation, temperature changes, direct expo-sure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

PART 2 PRODUCTS

2.1 MIRROR HARDWARE

A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.2 FABRICATION

A. Mirror Sizes: To suit Project conditions, and before tempering, cut mirrors to final sizes and shapes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.

1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

2. Proceed with mirror installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

3.3 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION

DIVISION 9
FINISHES

Ref.	Description
09220	Portland Cement Plaster
09260	Gypsum Board False Ceiling Systems
09310	Porcelain Tiles
09410	Cement Terrazzo
09900	Painting

SECTION 09220 PORTLAND CEMENT PLASTER

PART 1 GENERAL

1.01 Work Included

A. Three coat cement plaster with wood float trowelled finish coat.

B. Two coat cement plaster with rough finish coat to receive wall tiles.

1.02 Related Work

A. Section 03300: Cast-in-place concrete.

B. Section 04220: Concrete Masonry Unit.

1.03 Reference Standards

A. ASTM C150 - "Portland Cement".

B. ASTM C144 - "Sand for Cement Plaster Work".

C. ASTM C6 - "Normal Finishing Hydrated Lime".

D. ASTM C206 - "Special Finishing Hydrated Lime".

E. ASTM C35 - "Inorganic Aggregates for Use in Gypsum Plaster".

F. UL - "Underwriters' Laboratories Incorporated".

G. ASTM C631 - "Bonding Compounds for Interior Plastering".

1.04 Sample Panel

A. Construct 1000 mm wide x 1000 mm high sample panel with finished surface, using materials and methods specified herein, for review by the Engineer.

B. Accepted surface finish of sample establishes minimum standard of quality and workmanship of cement plaster work on job.

1.05 Environmental Conditions

A. Provide sufficient heat and ventilation in areas where work of this Section is being performed, so as to allow cement plaster to properly cure. Take precautionary measures necessary to ensure that excessive temperature changes do not occur.

PART 2 PRODUCTS

A. Plaster Materials: To requirements of the referenced standards.

B. Water: Clean, potable, free of sulphides, chlorides and soluble organic matter.

C. Sand: To BS 1200, graded 3 mm down, washed free of chlorides and sulphides, sampled and tested to BS 812 and ASTM C 897.

D. Cement: Portland, gray, normal to BS PD 6472, BS EN 197-1-CEM I 42.5 N and ASTM C 150 Type 1.

E. Single Coat Ready Mix Rush-Coat: To BS 5262:1991, BS 5492:1990, BS 4551: Part 2: 1998, ASTM C 150, ASTM C 926, ASTM C 897 such as PREMIX SRC from SODAMCO or equally approved.

F. Single Coat Ready Mix Plaster: To BS 5262:1991, BS 5492:1990, BS 4551: Part 2: 1998, ASTM C 150, ASTM C 926, ASTM C 897 such as PREMIX SP from SODAMCO or equally approved, with the following technical characteristics:

Density of wet product: 1.78.

Compressive strength: approx. 5 MPa @ 28 days.

Flexural strength: approx. 2 MPa @ 28 days

2.03 Metal Accessories

A. Angle Beads, Corner Mesh and Plaster stops: Minimum 0.50mm thick steel with rust inhibitive coating of longest possible lengths; sized and profiled to suit application. Angle beads to have bullnosed edges.

B. Expansion Joints: Back to back plaster stops of longest possible lengths.

C. Anchorages: Nails, staples, or other metal supports, of type and size to suit application and to rigidly secure metal accessories in place.

PART 3 EXECUTION

3.01 Preparation

A. Prior to application ensure mechanical and electrical services behind surfaces to receive cement plaster have been tested and approved.

B. Clean concrete and concrete block surfaces of dust, laitance, efflorescence, loose particles, grease or other foreign matter. Thoroughly wet surfaces before using acid solutions, solvents or detergents to perform cleaning. Thoroughly wash surfaces with clean water immediately following their use. Ensure mortar joints are flush.

C. Roughen smooth concrete surfaces so as to allow adequate adhesion. Use method acceptable to the Engineer.

D. Apply a bonding agent on concrete and concrete block surfaces which are to receive cement plaster. Apply in accordance with manufacturer's recommendations, ensuring complete coverage.

E. Ensure metal lath has been properly installed and rigidly secured.

F. Wet Concrete and Concrete block surfaces to reduce excessive suction.

G. Place metal accessories true to lines and levels.

3.02 Plastering

A. Apply cement plaster using two coat system and three coat system respectively.

B. Apply each basecoat to minimum thickness of 10 mm. Moist cure and allow each coat to slowly dry for minimum period of 24 hours.

C. Allow each coat to cure for minimum 3 days prior to application of the following coat.

D. Evenly dampen each coat, to ensure uniform suction, and apply the following coat. Apply to thickness sufficient to secure required texture but in no case less than 3 mm. Apply finish coat subject to requirements.

E. Maintain surface flatness, with maximum variation of 3.2mm in 3.000 m.

F. Provide surfaces receiving paint with a steel trowel finish, to match approved sample pane.

G. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.

H. Moist cure finish coat for minimum period of 48 hours.

3.03 Fire Rated Assemblies

A. Perform cement plaster work for fire rated assemblies in accordance with drawings and as recommended by Underwriter's Laboratories.

END OF SECTION

SECTION 09250 GYPSUM WALL BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract.

1.2 SUMMARY

A. This Section includes the following:
   1. Gypsum wall board partition.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 05500 - "Metal Fabrications".
   2. Section 06200 - "Finish Carpentry".
   3. Section 07900 - "Joint Sealants".
   4. Section 09900 - "Painting".

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

A. Product Data: For each type of product specified.

B. Installer Experience: List of five projects (minimum) of same type and standard of quality successfully erected by the installer with the same product.

C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of Engineers and Employers, and other any information required by the Engineer.

D. Shop Drawings: Showing locations, fabrication, and installation of control and expansion joints including reflected ceiling plans, sections, details of components, and attachments to other units of Work.

E. Samples: For the following products:
   1. Trim Accessories: Full-size sample in 300-mm-long length for each trim accessory indicated.

F. Product Certificates: Signed by manufacturers of gypsum board assembly components certifying that their products comply with specified requirements.

G. Installer Experience: List of five projects (minimum) of a similar nature carried out successfully by the installer with the same product endorsed by the manufacturer's representative.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm specializing in performing the work of this Section with minimum three years documented experience and that is approved, authorized, or licensed by the product manufacturer to install his product and that is eligible to receive manufacturer's warranty. Include project names and addresses, names and addresses of Engineers and Employers, and other information specified

B. Single-Source Responsibility for Gypsum Boards and Steel Framing: Obtain each type of gypsum board and other panel products and steel framing from a single manufacturer.

C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to the gypsum board manufacturer.

D. Mockups: Prior to finishing gypsum board assemblies, construct mockups of at least 9 sq. m in surface area to demonstrate aesthetic effects of finishes as well as qualities of materials and execution. Simulate finished lighting conditions for review of in-place unit of Work.

1. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

    a. Locate mockups on site in the location and of the size indicated or, if not indicated, as directed by the Engineer.
    b. Notify the Engineer one week in advance of the dates and times when mockups will be constructed.
    c. Demonstrate the proposed range of aesthetic effects and workmanship.
    d. Obtain the Engineer's approval of mockups before start of final unit of Work.
    e. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
    f. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

C. Handle steel framing materials in a manner not to cause bending or denting of sections.

1.7 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Room Temperatures: Maintain room temperature at not less than 7 deg. C.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Knauf
2. Or approved equal

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED CEILINGS

A. General: Provide components complying with ASTM C 754 for conditions indicated.

B. Post installed Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials, with holes or loops for attaching hanger wires, and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing according to ASTM E 488 conducted by a qualified independent testing agency.

1. Expansion anchor.

C. Wire Ties: ASTM A 641M, Class 1 zinc coating, soft temper, 1.6 mm thick.

D. Hanger Rods: Mild steel and zinc coated or protected with rust-inhibitive paint.

E. Flat Hangers: Mild steel and zinc coated or protected with rust-inhibitive paint.

F. Angle-Type Hangers: Angles with legs not less than 22.2 mm wide, formed from 1.6-mm- thick galvanized steel sheet complying with ASTM A 653M, Z 180 coating designation, with bolted connections and 8 mm diameter bolts.

G. Channels: Cold-rolled steel, 1.5 mm minimum thickness of base (uncoated) metal and 11.1 mm wide flanges, and as follows:

1. Carrying Channels: 38 mm deep, 70 kg/100 m, unless otherwise indicated.
2. Furring Channels: 19 mm deep, 45 kg/100 m, unless otherwise indicated.
3. Finish: ASTM A 653M, Z 180 hot-dip galvanized coating.

2.3 GYPSUM BOARD PARTITION

A. Gypsum board shall be plain gypsum board partition type having a high sag resistance, 12.5mm thick unless indicated otherwise anchored to support system with no apparent joints.
1. Long Edges: Tapered.
2. Type: Regular, unless otherwise indicated.
3. Thickness: 12.5 mm, unless otherwise indicated.
4. Use for application in wet areas and where indicated on Drawings or specified.

2.4 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed Joints: Manufacturer's standard non-sag, paintable, no staining latex sealant complying with ASTM C 834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, non-skinning, no staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

2.5 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Steel drill screws complying with ASTM C 1002 for the following applications:

1. Fastening gypsum board to steel members less than 0.84 mm thick.

C. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.84 to 2.84 mm thick.

D. Steel drill screws of size and type recommended by manufacturer for fastening gypsum boards to timber frames.

E. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 3.2 mm thick, in width to suit metal stud size indicated.

F. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing).

1. Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.
2. Blanket is to be 40 mm thick, 60 kg/m3 intensity, minimum.
3. Where ceiling plenum is used for air condition return, use sound blanket with foil scrim facing and set with facing at upper side in the as-installed position.
4. Use sound attenuation blankets where indicated or directed by the Engineer to attain sound attenuation performance.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with the Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support partition.

3.3 INSTALLING STEEL FRAMING FOR SUSPENDED CEILINGS

A. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counters playing, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacing that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyes crews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyes crews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.
5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Sway-brace suspended steel framing with hangers used for support.

3.3 INSTALLING STEEL FRAMING FOR SUSPENDED CEILINGS CONT'D

C. Install suspended steel framing components in sizes and at spacings recommended by manufacturer, but not less than that required by the referenced steel framing installation standard.

1. Wire Hangers: 1200 mm o.c.
2. Carrying Channels (Main Runners): 1200 mm o.c.
3. Furring Channels (Furring Members): 400 mm o.c.

D. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 3 mm in 3.6 m as measured both lengthwise on each member and transversely between parallel members.

E. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

3.4 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840.

B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

3.5 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: The Engineer will conduct an above-ceiling observation prior to installation of gypsum board partition and report any deficiencies in the Work observed. Do not proceed with installation of gypsum board to partition support framing until deficiencies have been corrected.

1. Notify the Engineer one week in advance of the date and the time when the Project, or part of the Project, will be ready for an above-ceiling observation.

3.6 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to the Installer, that ensure that gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 09260 GYPSUM BOARD FALSE CEILING SYSTEMS

PART 1 GENERAL

1.01 Work Included

A. Metal Framing required for gypsum board suspended ceilings.

B. Blocking.

C. Acoustical and sound insulation.

D. Thermal Insulation for z-furring channel installation.

E. Gypsum Board, fire rated, sound and thermal insulating.

F. Radiation Protection Gypsum Board.

G. Acoustical Sealant.

H. Taped and sanded joint treatment.

1.02 Related Work

A. Section 09900: Painting

1.03 Quality Assurance

A. Perform gypsum board systems work in accordance with recommendations of:

Gebr. Knauf

Westdeutsche Gipswerke

Export Department

D 8715 Iphofen, West Germany

Tel. No. 09323 31-1

Fax. No. 09323 31277

Telex 689300 29-9K

Or any approved equal.

C. The contractor shall submit to the engineer the names of three manufacturers and their products which will be acceptable under this section, approval of the manufacturer or product must be obtained before proceeding with the associated work.

1.04 Submittals

A. Submit samples of gypsum board systems and exposed joint covers in accordance with Section 01340. Include a sample of each material, texture, and color specified.

B. Submit manufacturer's recommendations for installation of thermal insulation and gypsum board.

1.05 References

A. GA 216 - Recommended Specifications for installation of thermal insulation and gypsum board.

B. Complies with ASTM C-36, 0-630 method C-473.

C. DIN 18180 - Insulation Blankets, Thermal Mineral Wool. DIN 4102 - Building Material Class B1 - Flame Resistance - Building Material Class A2 - Non-Combustible

PART 2 PRODUCTS

2.01 Metal Framing

A. Provide metal framing materials in accordance with GA 216.

B. Studs: 60 X 60 cm both directions.

C. Runners: Match studs.

2.02 Materials

A. Gypsum board false ceiling shall be 12.5mm thick concealed system similar to Knauf Gypsum Ceiling System D113.

B. Gypsum board false ceiling in toilets and kitchenettes' areas shall be moisture resistant type, 12.50 mm thick, and as for item "A" above.

C. Radiation protection gypsum board shall be 12.50mm thick concealed system similar to Kanuf Gypsum Ceiling System K151.

PART 3 EXECUTION

3.01 Metal Framing Erection - General

A. Erect metal framing in accordance with ASTM C764.

B. Install members true to lines and levels to provide surface flatness with maximum variation of 1/8 inch in 10 feet in any direction.

3.02 Ceiling Framing Installation

A. Coordinate location of hangers with other work.

B. Install ceiling framing independent of walls, columns, and above ceiling work.

C. Space main carrying channels at maximum 600 mm on center, not more than 150 mm from perimeter walls. Lap splices minimum 300 mm and secure together 50 mm from each end of splice.

D. Place furring channels perpendicular to carrying channels at 600 mm on center not more than 150 mm from perimeter walls. Lap splices minimum 200 mm and secure together 25 mm from each end of splice.

E. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 600 mm past each end of openings.

F. Laterally brace entire suspension system where required.

3.03 Gypsum Board Installation

A. Install gypsum board in accordance with recommendations of GA 216, the manufacturer's recommendations, or both.

B. Erect single layer standard gypsum board in direction most practical and economical, with ends and edges occurring over firm bearing.

C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

D. Erect exterior gypsum sheathing board horizontally, with edges butted tight and ends occurring over firm bearing.

E. Use screws when fastening gypsum board to metal furring or framing. Use nails or screws when fastening gypsum board to wood furring or framing. Staples may only be used when securing the first layer of double layer applications.

F. Erect patterned gypsum board horizontally/vertically, complete with exposed batten fastening system. Erect in accordance with manufacturer's recommendations.

G. Treat cut edges and holes in moisture resistant gypsum board with sealant.

H. Place control joints to be consistent with lines of building spaces and in consistent pattern and as directed by Engineer.

I. Place corner beads at external corners. Use longest practical lengths. Place edge trim where gypsum board abutts dissimilar materials.

J. Tape, fill, and sand exposed joints, edges, corners, openings and fixings, to produce surface ready to receive surface finishes.

K. Remove and re-do defective work.

3.04 Warranty/Guarantee

All warranties/guarantees to be issued by the Supplier, Manufacturers and Sub-Contractors shall be counter- signed by Main Contractor and both of them will be liable for repair/replace the items/works, etc., during the warrantee/guarantee period.

END OF SECTION

SECTION 09310 PORCELAIN TILES

PART 1 GENERAL

1.01 Work Included

A. PORCELAIN tile flooring, installed using the full mortar bed method, with cementitious grouted joints.

B. Porcelain tiled walls, installed using adhesive, with cementitious grouted joints. Adhesive and grout from an approved manufacturer.

C. Approved fine aggregate underlay of appropriate thickness.

D. Cement and sand mortar bed.

1.02 Related Work

A. Section 03251 Expansion and Contraction Joints.

1.03 Reference Standards

A. ANSI A108.5 - Porcelain Tile installed in the Dry-Set Portland Cement Mortar on Latex-Portland Cement Mortar.

B. ANSI A118.4 -Latex-Portland Cement Mortar.

C. ANSI A136.1 - Organic Adhesives for Installation of Porcelain Tile.

D. ANSI A42.4 - Interior Lathing & Furring.

E. Tile Council - Handbook for Porcelain Tile Installation. of America

F. TCA137.1 - Recommended Standard Specifications for Porcelain Tile.

1.04 Samples

A. Submit a 1000mm X 1000mm sample of Porcelain wall and floor tile installation, clearly indicating pattern, coloration and grouted joints. Submit in accordance with the Construction Manage's instructions.

1.05 Environmental Conditions

A. Provide sufficient heat and ventilation in areas where work of this section is being performed, so as to allow Porcelain tile to properly set. Take all precautionary measures necessary to ensure that excessive temperature changes do not occur.

1.06 Delivery and Storage

A. Deliver materials and store on site in original containers with seals unbroken and labels intact until time of use.

1.07 Extra Materials

A. Provide 25 sq m of each size, color, and surface finish of tile specified, packaged with labels clearly describing contents

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. The Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this section. Approval of the manufacturer or product must be obtained before proceeding with associated works.

2.02 Trim and Accessories

A. Threshold: Hand finish, beveled two sides, sizes and shapes as indicated on drawings

B. Trim shapes: provide bullnose, outside corners, caps and other trim section necessary, same type tiles as floor tiles.

2.03 Materials And Components For Floors

A. Porcelain Floor Tile: Square edges, of thickness as indicated on drawing; smooth surface; unglazed to the manufacturer properties and subject to the Engineer's approval.

B. Approved fine aggregate (sand) underlay of appropriate thickness, well leveled and tamped to receive the cement sand mortar bed.

C. Setting Bed: Full mortar bed, 30mm thick, or tile adhesive as approved by the Construction Manage.

D. Grout: Waterproof cementitious type; with latex additive, color selected by the Construction Manage; uniform in color and resistant to shrinking.

E. Water: Clean, fresh and free of deleterious substances.
F. Adhesive: as approved by the Construction Manage.

2.04 Materials And Components For Walls

A. Porcelain Wall Tile: cushioned edges; glazed surfaces to the manufacture properties and subject to the Engineer's approval.

B. Scratch Coat and Mortar Bed: Standard cementitious mortar materials for use in full bed setting methods; and/or wall tile adhesive.

C. Grout: Waterproof cementitions type; color selected by the Engineer; uniform in color and resistant to shrinking.

PART 3 - EXECUTION

3.01 Installation

A. Prior to installing floor tile, ensure surfaces are level, with maximum surface variation of 6mm in 3.00 meters, and are steel trowelled. Ensure surfaces slope to drains.

B. Prior to installing wall tile, ensure surfaces are level, with maximum surface variation of 3 mm in 3.00 meters.

C. Ensure surfaces are clean and well cured.

D. Do not commence until surface conditions are within tolerances required for proper installation.

E. Neatly cut tile around fixtures and drains. Accurately form corners, base, intersections and returns.

F. Ensure tile joints are uniform in width, subject to normal variance in tolerance allowed in tile size. Ensure joints are watertight, without voids, cracks, excess mortar or grout.

G. Form internal wall angles square and external angles rounded.

H. Sound tile after setting. Remove and replace hollow sounding units.

I. Keep expansion/contraction control joints free of mortar or grout.

J. Allow tile to set for a minimum of 48 hours prior to grouting.

K. Completed installation to be free of broken, damaged or faulty tile.

3.02 Cleaning

A. Clean work under provisions of 01700.

B. Clean tile and grout surfaces.

3.03 Protection Of Finished Work

A. Protect finished Work under provisions of Section 01500.

B. Do not permit traffic over finished floor surface for 4 days after installation

END OF SECTION

SECTION 09410 PORTLAND CEMENT TERRAZZO

PART 1 GENERAL

1.01 Work Included

A. Preparation of concrete substrate.

B. Terrazzo floor, colour as selected by the Engineer.

C. Skirting 100mm X 15mm thick.

D. Curing, grinding and sealing.

1.02 Related Work

A. Section 01340: Shop drawings, Product Data and Samples.

1.03 Reference Standards

A. BS 882 - Aggregate from natural sources for concrete.

B. BS 12 - Ordinary Portland Cement

C. BS 5075 - Concrete Admixtures, Air Entraining for concrete

D. National Terrazzo and Mosaic Association, Inc. (NTMA), Publication: Terrazzo Design Data Book (1972).

1.04 Product Data & Samples

A. Product data and samples shall be in accordance with Section 01340.

B. Prior to delivery of the materials to the site, the following samples shall be submitted for approval to the Engineer:

1. Terrazzo - Two sample panels of each type finish including abrasive, if required, or color combination. Minimum dimension of tile shall be 200mm thick.

C. Copies of Manufacturer's Specifications and installation instructions for each type of precast terrazzo and material shall be submitted to the Engineer.

1.05 Shop Drawings

A. Shop drawings shall be in accordance with Section 01340.

B. Shop drawings showing location, extent, size, shape, and jointing of each type of precast terrazzo item required. Details of anchorage and other special features required shall be included.

1.06 Delivery, Storage & Handling

A. Manufacturer's packaged materials shall be delivered and stored in their original containers with seals unbroken and labels intact until time of use. Materials shall be protected against the inclusion of foreign matter and/or water and other damage.

1.07 ENVIRONMENTAL CONDITIONS

A. The substrate and the conditions under which the terrazzo is to be installed shall be carefully examined. The Contractor shall submit notification to the Engineer of any unsatisfactory conditions which will affect the terrazzo installations. Work shall not proceed until such unsatisfactory conditions have been corrected and the surfaces are acceptable.

B. The ambient surroundings and temperature of cementitious mixtures shall be not less than 10 degrees C. from the time the setting beds are placed until completely cured.

PART 2 PRODUCTS

2.01 Materials

Shall conform to the respective specifications and other requirements specified below:

A. Portland cement: BS 12 Cement shall be obtained from a single source for all work of one color.

1. Non-staining white or gray shall be provided as required for terrazzo matrix.

B. Sand: BS 882, for fine aggregate.

C. Water shall be clean, free of oil, soluble salts, or other deleterious substances.

D. Aggregate shall be natural, sound, crushed marble chips without excessive flats or flakes. Colors and gradation of sizes shall be as required to match approved samples.

E. Matrix pigments shall be pure mineral or synthetic pigments, resistant to alkalies and nonfading. Pigments shall be mixed with cement, by weight, to provide colors as required to match approved samples.

F. Cleaner shall be liquid, neutral chemical cleaner, formulated for Portland cement terrazzo, as recommended by the Manufacturer of the sealer.

G. Interior floor sealer shall be colorless, non-slip, stain-resistant penetrating sealer which will not disturb the color or physical properties of the terrazzo surface.

H. Exterior sealer shall be a colorless, non-yellowing, penetrating, synthetic resin sealer for terrazzo.

I. Air-entraining admixture: BS 5075.

2.02 Precasting

A. NTMA specifications and recommendations for fabrication of precast terrazzo shall be complied with.

B. Units shall be cast accurately to size and profile indicated on approved shop drawings.

C. Type of Portland cement, amount of pigment, if any, and percentages of aggregate shall be in accordance with approved NTMA color plates.

D. Exposed edges of precast items shall have 3.2 mm radius unless otherwise indicated.

E. Abrasive aggregate, approximately 15 percent by volume, shall be provided in both the topping mix aggregate and the aggregate seeded during installation in the non-slip areas shown on the drawings.

G. All precast members shall be moist-cured in compliance with NTMA specifications.

H. Cured terrazzo topping shall be grouted and ground in accordance with NTMA specifications. Finishing shall be by fine grinding with abrasive grit of the size specified by NTMA, or as otherwise required to match approved samples.

I. Terrazzo surfaces to receive rustic finish shall be washed to remove approximately 1.5mm of uncured matrix, without disturbing the aggregate. Curing shall be as specified by NTMA. The terrazzo surface shall be saturated with water and cleaned with a 20 percent solution of muriatic acid (9-parts water to 1-part commercial acid) then rinsed thoroughly with clean water to remove and neutralize the acid wash. The terrazzo surface shall match the approved samples for depth of etch into matrix.

PART 3 EXECUTION

3.01 Installation

A. Preparation of substrate, proportioning setting bed, and placing, grouting, and finishing shall be in accordance with NTMA specifications and recommendations unless otherwise shown or specified.

B. Setting bed mortar shall be one-part Portland cement and three to four parts clean sharp sand. Only enough water to produce a workable mix shall be added.

C. Terrazzo installation shall be completed before the application of other items which might be damaged by this work.

D. Terrazzo skirting shall be installed after placing floor tile or other terrazzo floor toppings. Skirting shall be set accurately to wall and floor finish lines.

E. Floor tile shall be laid out to avoid pieces less than one half tile size.

F. Field cutting of precast terrazzo, where required, shall be with high speed diamond or other abrasive saws.

G. Joints shall be aligned in floor tile at right angles to each other and straight with walls.

H. All tiles shall be applied with straight joints each way unless otherwise indicated.

I. Precast terrazzo shall be installed as shown and in accordance with NTMA specifications. Units shall be tamped into setting bed to achieve a full bond without voids, and leveled at joints. Units shall be finish ground at joints if required to remove any minor discrepancies in level of units. Warped, stained, damaged, and non-matching units shall be replaced as directed. Joints shall be grouted, except those shown to receive sealant, with a mixture of Portland cement, pigment, and water matching the matrix of the units.

3.02 Cleaning and Sealing

A. Terrazzo shall be cleaned after all installation and finishing operations are completed in accordance with the instructions of the terrazzo sealer Manufacturer.

B. Sealer shall be applied to cleaned terrazzo surfaces in accordance with Manufacturer's Instructions. The maximum number of coats of sealer recommended by the Manufacturer shall be applied.

3.03 Final Cleaning and Protection

A. Terrazzo shall be cleaned as recommended by the Manufacturer of the sealer, and machine buff if required when buildings are ready for occupancy.

B. Protection shall be provided for finished terrazzo work until buildings are ready for occupancy.

END OF SECTION

SECTION 09900 PAINTING

PART 1 GENERAL

1.01 Work Included

A. Prepare surfaces which are to receive finish.

B. Supply and apply paint finish in accordance with the finishing schedule.

C. Spot priming and painting of materials delivered to the site, factory finished.

D. Emulsion paint on rendered/plastered and fair-face concrete surfaces, internally

E. Gypsum Boards Paint

F. Paint for concrete surfaces, where required.

G. Exterior grade finishing to external wall panels and other concrete and masonry surfaces.

1.02 Related Work

A. Section 03346: Concrete Floor Finish

B. Section 05500: Miscellaneous Metals

C. Section 08110: Steel Doors & Frames

D. Section 09220: Portland Cement Plaster

1.03 Mock-Up

A. Before proceeding with paint application, finish one complete surface of each color scheme required, clearly indicating selected colors, finish texture, materials and workmanship.

B. If approved, sample area will serve as a minimum standard for work throughout building.

1.04 Samples

A. Prepare 500 mm x 100 mm samples of finishes when requested by Engineer. When possible, apply finishes on identical type materials to which they will be applied on job.

B. Identify each sample as to finish, formula, color name and number and sheen name and gloss units.

C. Colors to be selected by Engineer prior to commencement of work.

1.05 Maintenance Materials

A. Leave on Premises, where directed by Engineer, not less than one (1) five liter can of each color used.

B. Containers to be tightly sealed and clearly labeled for identification.

1.06 Delivery, Storage and Handling

A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, color designation and instructions for mixing and/or reducing.

B. Provide adequate storage facilities. Store paint materials at minimum ambient temperature of 7 degrees C in well ventilated area.

C. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.07 Environmental Conditions

A. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture contents of surfaces are below following maximums:

1) Plastered surfaces: 12%

2) Masonry, concrete and concrete block: 12%.

B. Ensure surface temperatures or the surrounding air temperature is above 5 degrees C before applying finishes. Minimum application temperatures for latex paints for interior work is 7 degrees C and 10 degrees C for exterior work.

C. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 7 degrees C for 24 hours before, during and 48 hours after application of finishes.

1.08 Protection

A. Before painting is commenced floors shall be swept and washed over; surfaces to be painted shall be cleaned before applying paint as specified, and all precautions taken to keep down dust whilst work is in progress.

B. No paint shall be applied to surfaces structurally or superficially damp and all surfaces must be ascertained to be free from condensation efflorescence, etc. before the application of each coat.

C. No painting shall be carried out externally during humid, rainy, damp foggy or freezing conditions, or conditions where surfaces have attained excessively high temperatures or during dust storms.

D. No new, primed or undercoat woodwork and metalwork shall be left in an exposed or unsuitable situation for an undue period before completing the process.

E. No dilution of paint materials shall be allowed unless stated otherwise and except strictly as detailed by the manufacturer's own direction, either on the containers, or their literature, and with the special permission of the Engineer. For external work dilution of paints will not be allowed whatsoever. For internal work, where permitted by the Engineer, undercoats may be thinned by the addition of not more than 5% thinners. Gloss finish shall not be thinned at all.

A. Metal fittings such as ironmongery, etc., not required to be painted shall first be fitted and then removed before the preparatory process are commenced. When all painting is completed the fittings shall be cleaned as necessary and refixed in position.

1.08 Protection (cont'd)

G. New concrete shall be allowed to age a minimum of 28 days prior to coating application. The surface must then be chemically treated or sweep blasted to remove the laitance layer. The PH of the concrete surface should be within the 6.8 - 8.0 range for safe coating application. If the surface PH is outside this range, the fresh water rinse should be repeated until PH is within the required range.

H. Plaster work shall be prepared by removing all loose friable materials by wire brushing/sanding. Surfaces are to be cleaned to remove dust, dirt, oil grease, etc.

I. Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.

J. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

K. Place cotton waste, cloths and material which may constitute a fire hazard in closed metal containers and remove daily from site.

L. Remove electrical plates, surface hardware, fittings and fastenings, prior to painting operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvent to clean hardware that may remove permanent lacquer finish.

1.09 Guarantee/Warranty

A. All warranties/guarantees to be issued by the Supplier, Manufacturers and Sub-Contractors shall be countersigned by Main Contractor and both of them will be liable for repair/replace the items/works, etc., during the warrantee/guarantee period.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. DULUX

B. Jotun

C. Unless otherwise the Contractor shall submit to the Engineer the names of three manufacturers and their products which will be acceptable under this Section. Approval of the manufacturer or product must be obtained before proceeding with associated work.

D. Substitutions: Items of the same function and performance are acceptable in accordance with Section 01630.

2.02 Materials

A. Powder coated paint, Varnish, Stain, Enamel, clear Lacquer, Polyurethane, Dico and Fillers: Type and brand or equivalent products, approved by Engineer.

B. Paint Accessory Materials: (Linseed oil, shellac, turpentine and other materials not specifically indicated herein but required to achieve the finishes specified) of high quality and approved manufacturer.

C. Paints: Ready-mixed except field catalyzed coatings. Pigments fully ground maintaining a soft paste consistency, capable of readily and uniformly dispersed to a complete homogeneous mixture.

D. Paints to have good flowing and brushing properties and be capable of dry or curing free of streaks or sags.

E. Powder coated paint shall be applied as recommended by the manufacturer for metal work.

PART 3 EXECUTION

3.01 Inspection

A. Thoroughly examine surfaces scheduled to be painted prior to commencement of work. Report in writing to Engineer, any condition that may potentially affect proper application. Do not commence until such defects have been corrected.

B. Correct defects and deficiencies in surfaces which may adversely affect work of this section.

C. No priming coats shall be applied until the surface have been inspected and the preparatory work has been approved by the Engineer. No undercoats or finishing coats shall be applied until the previous coat has been similarly inspected and approved.

3.02 Preparation of Surfaces

A. Remove mildew, by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry completely.

B. Remove surface contamination from aluminum surfaces requiring a paint finish by steam, high pressure water or solvent washing. Apply etching primer or acid etch. Apply paint immediately after acid etching.

C. Remove dirt, oil, grease and sand if necessary to provide adhesion key, when asphalt, creosote or bituminous surfaces require a paint finish. Apply latex based compatible sealer or primer.

3.02 Preparation Of Surfaces (cont'd)

D. Remove dirt, grease and oil from canvas and cotton insulated coverings.

E. Remove contamination, acid etch and rinse new concrete floors with clear water. Ensure required acid-alkali balance is achieved. Allow to thoroughly dry.

F. Remove contamination from copper surfaces requiring paint finish by steam, high pressure water or solvent washing. Apply vinyl etch primer or acid etch. Apply paint immediately after acid etching.

G. Remove surface contamination and oils from galvanized surfaces and wash with solvent. Apply coat of etching type primer.

H. Remove surface contamination and oils from zinc coated surfaces and prepare for priming in accordance with metal manufacturer's recommendations.

I. Remove dirt, loose mortar, scale, powder and other foreign matter from concrete and concrete block surfaces which are to be painted or to receive a clear seal. Remove oil and grease with a solution of tri-sodium phosphate, rinse well and allow to thoroughly dry.

J. Remove stains from concrete and concrete block surfaces caused by weathering of corroding metals with a solution of sodium meta silicate after being thoroughly soaked with water. Allow to thoroughly dry.

K. Fill hairline cracks, small holes and imperfections on plaster surfaces with patching plaster. Smooth off to match adjacent surfaces. Wash and neutralize high alkali surfaces where they occur.

L. Remove grease, rust, scale, dirt and dust from steel and iron surfaces. Where heavy coatings of scale are evident, removed by wire brushing, sandblasting or any other necessary method. Ensure steel surfaces are satisfactory before paint finishing.

M. Clean unprimed steel surfaces by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Prime surfaces to indicate defects, if any. Paint after defects have been remedied.

N. Sand and scrape shop primed steel surfaces to remove loose primer and rust. Feather out edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime steel including shop primed steels.

3.03 Paint Application

A. Each coat of paint shall be so applied as to produce a film of uniform thickness. All paint shall be applied in accordance with the manufacturer's instructions. Special attention shall be given to ensure that all surfaces including edges, corners, crevices, welds and rivets receive a film thickness equivalent to that of adjacent painted. Surfaces paint to plaster is to brush applied.

B. Each coat of paint is to be slightly darker than preceding coat unless otherwise approved by Engineer.

C. Sand lightly between coats to achieve required finish.

D. Do not apply finishes on surfaces that are not sufficiently dry.

E. Heated Surfaces:

1. Heated surfaces such as radiators and pipes shall remain cold until each coat applied is completely dry.

F. Drying:

1. All coats shall be thoroughly dried before succeeding coats are applied. Allow a minimum of 24 hours between application on any one surface, unless otherwise specified by the manufacturer.

G. Plastered Surfaces (OPTIONAL):

1. Plastered surfaces shall be rubbed down smooth and any cracks cut out and filled. The Contractor shall also apply one coat of Tropaline Putty Filler to the plastered surface prior to the application of paint to provide an absolutely smooth surface.

L. Colors:

1. The colour will be selected by the Employer and/or the Engineer from the paint manufacturer's standard colour range.

M. Protection:

1. Proper care must be taken to protect surfaces while still wet by the use of screens, and 'wet paint' signs where necessary.

N. Damage:

1. Care must be taken when preparing surfaces, or painting, etc. not to stain or damage other work. Dust sheets and covers to the satisfaction of the Engineer shall be used to protect adjacent work. Any such stains or damage shall be removed and made good at the Contractor's expense.

3.03 Paint Application (Cont'd)

O. Cleanliness:

1. All brushes, tools, pails kettles and equipment shall be clean and free from foreign matter. They shall be thoroughly cleaned after use and before being used for different color's types or classes or material. Painting shall not be carried out in the vicinity of other operations that may cause dust. Waste liquids, oil-soaked rag, etc., shall be removed from the building each day. Waste liquids shall not be thrown down any sanitary fittings or drains.

P. Performance:

1. If, while the work is in progress, the paint appears to be faulty, such as consistency of colour, drying time or quality of finish, the work shall be stopped at once and the manufacturer consulted.

2. The manufacturer of the materials shall be given every facility for inspecting the work during progress in order to ascertain that the materials are being used in accordance to their directions, and to take samples of their products from the site if they so desire for tests.

3. The finishing coats of the various paints or surface finishing shall be free from sags, brush marks, runs, wrinkling, dust, bare of 'starved' patches, variations in colour and texture, and other blemishes.

4. When the work has been completed, the finished surfaces shall not be inferior in quality, colour and finish to the samples approved by the Engineer, and imperfections in manufacture shall not be apparent through these finished surfaces. In the event the Engineer is not satisfied with the quality of finish (does not comply with the required standards and/or the sample panel) the Contractor will be required to repaint at his own expense, such work to the satisfaction of the Engineer. in the opinion of the Engineer it is necessary to remove completely the unsatisfactory paint work this shall also be done under the direction of the Engineer at the expense of the Contractor.

Q. Emulsion Paints and Undercoats (Based On the approved manufacturer's written instructions and recommendations):

1. The internal paint finish to rendered walls and for fair face concrete ceilings and/or gypsum board ceilings shall be as follows and of colour as selected by the Engineer:

   a) Apply two coats of primer coat (vinyl primer sealer) at the rate of 40m2 per gallon.
   b) Spot putty and spot prime (OPTIONAL)
   c) apply two coats of putty filler (OPTIONAL)
   c) Apply 1st coat of emulsion paint at the rate of 35m2 per gallon.
   d) Apply 2nd coat of emulsion paint at the rate of 30-35 m2 per gallon.
   e) Sand down between coats.

3.03 Paint Application (Cont'd)

R. The internal partitions finish to gypsum partitions, shall be of "Special" coat paint and shall be as follows and of color as selected by the Engineer.

1) Remove dirt and grease on the surface and the surface should be kept dry.
2) apply two coats of primer coat (Special Paint) at the rate of 11.3 m2/l/coat
3) apply two coats of intermediate coats at the rate of 13.2m3/l/coat
4) apply one coat of top coat (Special) at the rate of 3.3m2/l/coat.

S. Exterior Concrete Surfaces

1) System "A" Smooth Surfaces.

a) Primer coat acrylic Filler at the rate of 45 M2 per gallon.

b) 1st coat Acrylic Emulsion at the rate of 35 M2 per gallon.

c) 2nd coat Acrylic Emulsion at the rate of 35 M2 per gallon.

2) System "B" Textured Surfaces

a) Primer coat Acrylic Block Filler at the rate of 35 M2 per gallon.

b) Acrylic Textured coating at the rate of 1 to 1.2 Lt. per square meter, type of paint shall be approved by the Engineer before proceeding with associated work.

c) The surface to be coated shall be deemed to be in accordance with the manufacturers recommendations and shall be free from agents which may affect the adhesion of the surface coating.

d) All fragile or loose matter on surface of concrete is to be removed prior to coating to provide a hard and stable base. All cement burrs, efflorescence, cement powder and the like shall be removed by scraper, sand paper or wire brush.

e) The coating shall be applied in accordance with the manufacturers printed instructions.

f) Application of paint shall not be carried out when winds or rain.

g) Thinners shall only be permitted to be used in accordance with the manufacturers written instructions, and shall be of a type recommended by the manufacturer.

h) Sealers, bases and hardeners shall be thoroughly mixed in the exact proportions as specified by the manufacturer, and shall be mixed in clean containers specifically for the sole use of the coating.

3.05 Cleaning

A. As work proceeds and upon completion, promptly remove paint where spilled, splashed or spattered.

B. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Upon completion of work leave premises neat and clean, to the satisfaction of Engineer.

END OF SECTION

B. PARTICULAR TECHNICAL SPECIFICATION

	Material Description:	Supplier:
1.	Steel structure roof works including: flashing, gutter and ridge details	Mousa Jadda
2.	PVC floors	Decor: Contact Ashraf Qadoura 0796666596
3.	Retractable shading system	Shishani aluminum: Contact Soufian Shishani 0796548880
4.	External rubber flooring	Mondo construction company: Contact George Mondo 0777250450
5.	Terrazzo Tiles:	Load bearing cement based 33.3x33.3x2.7cm Terrazzo floor tiles by Jordan Cypriot Construction Industries. Tile color to approval. Nominal 2mm joint width. Tile level = FFL minus 6mm Tiles to be fully adhered to cementitious mortar bed with no voids. Back of tile to be wet during laying. Mortar composition 1:4:0.5 Cement:Sand:Water Mortar to be fully cured prior to grouting. All spacers to be removed and all joints cleared prior to grouting. Tiles to be grouted using proprietary grout (ArtGrout) for polishing by Texcrete or similar approved. Grout to fully cure prior to honing. Grout color to match tile. Tiles to be honed (not polished) to achieve a completely flat and horizontal surface to the approval Architectural Inspections and approvals required: - Prior to grouting - After grouting - After honing

Creative Concrete Concepts

ArtCrete 801

Colored Stucco Finish Coat

TECHNICAL DATA SHEET

DESCRIPTION • Ultimate performance, polymer modified, fiber reinforced, cement based, colored finish stucco formulated for high adhesion, flexibility, and unparallerelled weathering. *ArtCrete 801* is a highly decorative finish coat with infinite textures and application possibilities only limited by the skill and imagination of the mason. *ArtCrete 801* may be applied in 2-20 mm thicknesses on a variety of substrates including fair faced concrete and gray plaster.

USES • *ArtCrete 801 Colored Stucco Finish* is suitable for use as a finishing coat on exterior and interior walls and facades ranging from residential to heavy commercial and industrial buildings. Due to its superior adhesion strength and flexibility, it can be applied over a wide variety of bases. *ArtCrete 801* is typically applied as the finish coat in a three coat system, with gray plaster forming the leveling and base coat. *ArtCrete 801* may also be applied directly on precast concrete surfaces.

ADVANTAGES •

- ✓ Superior adhesion.
- ✓ Highly flexible and resistant to cracking.
- ✓ Does not require a key coat of primer.
- ✓ Breathable, allowing humidity to escape.
- ✓ Cement-based; compatible with substrate.
- ✓ Minimum need for maintenance.
- ✓ Extremely durable for all climates.
- ✓ Wide range of application, 2mm to 20mm.
- ✓ Wide choice of colors.
- ✓ Easy to apply and self curing.
- ✓ Unlimited choice of finishing textures.

PERFORMANCE CHARACTERESTICS •

Weather Resistance: *ArtCrete 801* has the ability to withstand weathering including resistance to rain and extreme thermal and moisture changes.

Tensile Strength: *ArtCrete 801* is able to resist tensile stresses, whether developed internally or externally, due to the material properties' compatibility with a cement-based substrate.

Crack Resistance: Due to its high degree of flexibility, *ArtCrete 801* is able to withstand bending of the substrate and to bridge hairline cracks.

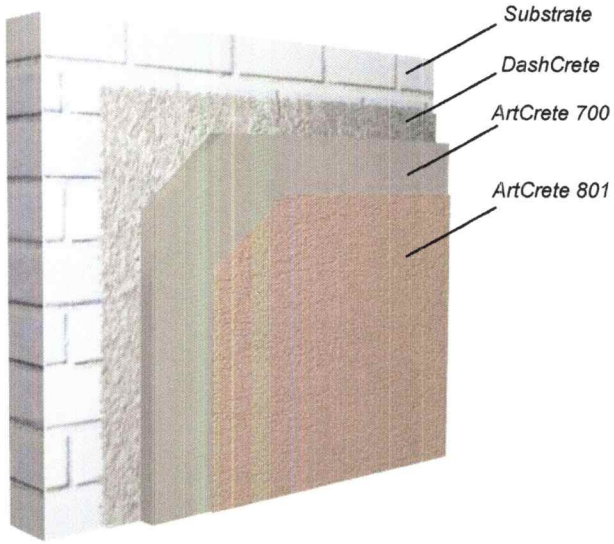
Bond: *ArtCrete 801* can be applied directly on a variety of surfaces, including non-cement based substrates such as gypsum board and wood panels.

COVERAGE • Coverage depends on the tools used for application, texture, surface irregularities and roughness. Coverage of approximately 10 sq meters per 35 kg bag at 3 mm thickness is dominant.

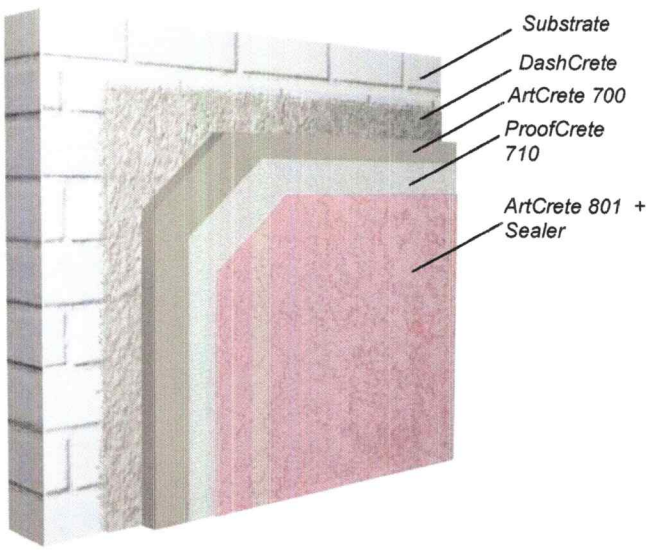
LIMITATIONS • Do not mix or apply if ambient temperature is expected to drop below 5°C during installation or in the proceeding 24 hours, or if rain is expected in the proceeding 24 hour period after application. Do not mix or apply when ambient temperature is expected to exceed 35°C. Avoid working in direct sunlight. Temporary protection from weather and other damage must be provided at all times until entire job is completed.

SYSTEM CONFIGURATION •

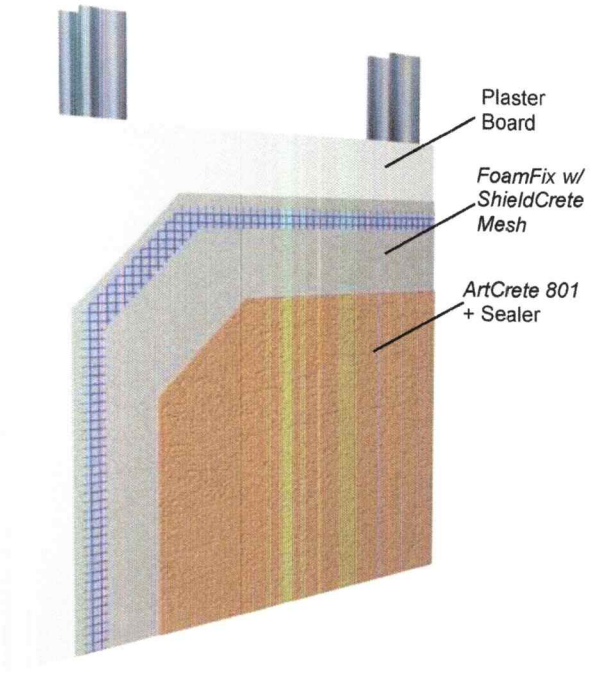
ArtCrete 3-Coat System:



ArtCrete 5-Coat System:



ArtCrete Plus System:



TECHNICAL DATA • Complies with EN 998 requirements for wall render finish.

Test	Criteria	Result
Flexural Strength EN 12808-3:2002 ASTM C 348 7 days 28 days	≥ 3.5 N/mm^2 n/a	3.5 N/mm^2 3.2 N/mm^2 6.6 N/mm^2
Compressive Strength EN 12808-3:2002 ASTM C 109 3 days 7 days 28 days	≥ 2.5 N/mm^2 n/a	9.7 N/mm^2 7.0 N/mm^2 13.4 N/mm^2 18.3 N/mm^2
Abrasion Resistance (EN 12808-2:2002)	≤ 2,000 mm^3	276 mm^3
Shrinkage Test - 28 days (EN 12808-4)	≤ 2 mm/m	1.26 mm/m
Water Absorption (EN 12808-5) After 30 minutes After 240 minutes	 ≤ 5 g ≤ 10 g	 2.33 g 5.08 g
Tensile Adhesion (EN 998)	≥ 0.3 N/mm^2	0.58 N/mm^2
VOC (*w/A-Z Penetrating Sealer WB*), USEPA 24	n/a	0 g/L
Ignitability, BS EN ISO 11925-2	n/a	Class E (non ignitable)

SURFACE PREPARATION • *ArtCrete 801* is very compatible with concrete masonry and new concrete and can be applied on an array of bases: block, brick, plaster, gypsum board, and wood panels. All bases should be sufficiently rigid, clean of any surface contamination that may prevent good suction. Dense, smooth surfaces, and those retaining excessive amount of form release agent can cause delamination of the plaster from the base. High gloss, or low absorption surfaces can be made more receptive by sandblasting.

Any painted or coated surfaces should be sandblasted or pressure washed to remove existing coating. The base should be straight, true to line, and plane. Misalignment of substrate can be corrected with *ArtCrete 700 Brown Coat Ready Mix Plaster*, avoiding excessive and different plaster thicknesses within a single panel.

MIXING • Mixing should be completed by a mechanical method, preferably with a paddle type mixer. Drill mounted jiffy type mixers can also be used. Always add clean potable water first. Mixing duration should last for 3 to 5 minutes to insure proper color and material dispersion within the mix. Typically, one 35 kg bag will require 8-9 liters of water, though the plasterer can best judge the required consistency depending on the desired finish, while observing its workability and the degree of bonding to the substrate. However, care should be taken not to exceed 10 liters of water per 35 kg bag.

APPLICATION • *ArtCrete 801* can be applied by hand or machine to a thickness of not less than 2mm. A maximum of 10mm in a single coat application can be managed efficiently; however, some textures can be applied to thickness of up to 20mm.

A steel trowel, wood float and a sponge float are used in conjunction with a small amount of clean water to produce any texture desired. Anywhere from a smooth steel trowel to a Spanish finish can be attained. *ArtCrete 801* advanced formulation allows for simple fast applications without the requirement of densification. Unlike other plasters, the surface will not slag, crack, or delaminate if not floated.

The textured finish is achieved by scrapping, floating or trowelling while the plaster is still "green". A uniform approach is essential to achieve an even finish. The application of a coat of plaster should not be interrupted within a façade, the applicator must plan ahead to complete the work up to either a control joint or to a corner of a façade before halting the application for any reason. When using a plaster machine, the plaster is applied in a continuous operation and finished manually to the specified thickness. Texture is controlled by the air pressure, the opening of the orifice, and the distance of the nozzle from the surface.

Installation on Block Work: For block work, *ArtCrete 3-Coat System* is the most suitable configuration. As shown in the illustration above, *DashCrete* is first

installed on a block work or concrete wall for a keying coat, followed with a leveling coat of *ArtCrete 700 Pre-Blended Plaster* in 10-20 mm thickness. *ArtCrete 801* is then installed as the finish coat in thickness to achieve the desired finish.

For additional protection against moisture and efflorescence problems, *ArtCrete 5-Coat System* is the highest performing system. An additional layer of *ProofCrete 710 Single Component Flexible Cementitious Waterproofing* provides an isolation layer between the finish coat and the substrate.

Installation on Plaster Board: For installation on marine grade gypsum board or cement board, follow the *ArtCrete Plus System* illustrated above. Install a base layer of *FoamFix ST* with fiberglass mesh such as *ShieldCrete MD* 145 g mesh or *ShieldCrete SD* 160 g mesh. It is recommended to pre-treat board joints either with an extra layer of *FoamFix* and fiberglass mesh or another compatible system.

Installation on Field Mixed Plaster: If a 3-coat system has already been installed and the quality of the gray plaster is questionable, installing a base layer of *FoamFix ST* with an embedded fiberglass mesh as detailed in the *ArtCrete Plus System* may help reduce the chances of small cracks in the gray plaster from reflecting onto the *ArtCrete 801* finish coat. The *FoamFix* layer also acts as a good isolation layer that can reduce efflorescence problems from appearing in the finish coat.

CURING • *ArtCrete 801* is self-curing designed to be air cured only. Moist curing should be applied to the base coat only where applicable, and continued until the application of *ArtCrete 801*. The use of *A-Z 100 Curing Agent* is recommended when applying on surfaces permanently in contact with water.

SEALING • In order to avoid staining of the render from rain runoff water or other sources and to facilitate easy cleaning, it is highly recommended to seal the render once it has fully set. The render may be sealed with any grade of *A-Z Penetrating Sealer*, or *A-Z HydroSeal* for more demanding applications. On surfaces permanently in contact with water, the use of *A-Z HydroSeal* is recommended.

CLEANING • Clean all tools and equipment promptly with clean water.

STORAGE • Keep material covered and off the ground to prevent exposure to moisture. Store in a dry area. When stored at specified conditions in original unopened packaging, shelf life is 12 months from date of purchase.

SAFETY PRECAUTIONS • KEEP OUT OF REACH OF CHIDREN. DO NOT TAKE INTERNALLY. Portland cement and silica based products present health hazards. Irritating to eyes and skin. Use in adequate ventilation and do not breath dust. Contains silica aggregates (quartz). May cause delayed lung injury (silicosis). Use neoprene gloves and a dust mask when handling. FIRST AID: Eyes – Do not rub eyes, immediately flush with fresh water. Skin – Wash with soap and water. Inhalation – If experience difficulty breathing or if inhaled, move to fresh air. If symptoms persist, seek medical attention.

PACKAGING • 35 kg paper bags.

SUGGESTED SHORT FORM SPECIFICATIONS • All architectural surfaces designated in the plans or specifications as having an integrally colored stucco finish shall have CREATIVE CONCRETE CONCEPTS ArtCrete 801™ installed in accordance with manufacturer technical data sheet and written instructions in the ArtCrete [*3-Coat, 5-Coat*] System. The dash coat shall be CREATIVE CONCRETE CONCEPTS DashCrete™ Splatter Dash Coat applied over the block work substrate in accordance with manufacturer technical data sheet and instructions. The leveling brown coat shall be CREATIVE CONCRETE CONCEPTS ArtCrete 700™ Factory Blended Plaster applied in [____] mm thickness and cured in accordance with manufacturer technical data sheet and instructions. [*For 5-coat system only:* Waterproofing coat shall be CREATIVE CONCRETE CONCEPTS ProofCrete 709™ Single Component Cementitious Waterproofing Coat applied in accordance with manufacturer technical data sheet and instructions]. The finish coat shall be CREATIVE CONCRETE CONCEPTS ArtCrete 801™ Colored Stucco Finish Coat applied in [___] mm thickness in required texture and color *[select from CCC Standard Color Chart]*. All finished surfaces must be sealed with CREATIVE CONCRETE CONCEPTS [*A-Z Penetrating Sealer WB/LS/SB/SMK™, A-Z HydroSealer™*] in accordance with manufacturer technical data sheet and instructions. All products shall be manufactured by CREATIVE CONCRETE CONCEPTS, Sharjah, UAE or Amman, Jordan; info@tex-crete.com.

Creative Concrete Concepts
PO Box 925794, Amman 1110, Jordan; Tel +962-6-487-4078, Fax +962-6-488-9133 • PO Box 91234, City of Industry, CA 91715-1234, USA; Tel +1-909-266-0709, Fax +1-909-266-0711 • PO Box 31017, Sharjah, UAE; Tel +971-6-532-1119, Fax +971-6-532-8833

TENDER
SPECIFICATION

Eclipse Premium

The selected flooring similar to Eclipse Premium belongs to the compact vinyl floors category under the ISO standard 15081, available in 2m wide sheet with a Binder Content of Type I.

The product formulation does not contain phthalate based plasticizer. The product is a pressed homogeneous vinyl flooring and contains over 25% of recycled material.

The product is reinforced with a UV photo crosslinked polyurethane, X-treme Reinforcement xr™, which suppresses any wax and regenerating polish spray maintenance operations.

The product is installed **with multicolour welding rods to ensure seamless finish.**

Its emission rate of volatile organic compounds in air is very low, measured after 28 days according to EN 16516 standard. Close to zero emission (quantification limit), **TVOC, TSVOC and formaldehyde emissions are below than 10 µg/m³.**

It is free of formaldehyde and **100% REACH compliant.**

It is 100% recyclable and installation off-cuts can be collected and recycled in the products through the Tarkett ReStart® program.

Eclipse Premium comes with a **10 Year Warranty.**

Primo Premium

The selected flooring similar to Primo Premium belongs to the compact vinyl floors category under the ISO standard 15081, available in 2m wide sheet with a Binder Content of Type I.

The product formulation does not contain phthalate based plasticizer. The product is a pressed homogeneous vinyl flooring and contains over 25% of recycled material.

The product is reinforced with a UV photo crosslinked polyurethane, X-treme Reinforcement xr™, which suppresses any wax and regenerating polish spray maintenance operations.

The product is installed **with multicolour welding rods to ensure seamless finish.**

Its emission rate of volatile organic compounds in air is very low, measured after 28 days according to EN 16516 standard. Close to zero emission (quantification limit), **TVOC, TSVOC and formaldehyde emissions are below than 10 µg/m³.**

It is free of formaldehyde and **100% REACH compliant.**

It is 100% recyclable and installation off-cuts can be collected and recycled in the products through the Tarkett ReStart® program.

Primo Premium comes with a **10 Year Warranty.**

More excellent reasons to choose Premium Collection

- ✔ 100% Phthalate Free
- ✔ Zero formaldehyde
- ✔ 100% recyclable
- ✔ Test reports and certificates available upon request
- ✔ Optimal indoor air quality
- ✔ TVOC <10µg/m³ after 28 days
- ✔ FloorScore® certified
- ✔ ISO 14001 certified production site
- ✔ REACH Compliant and CE Marking

TECHNICAL
DATA SHEET

TECHNICAL DATA	STANDARD	ECLIPSE PREMIUM	ECLIPSE ACOUSTIC	PRIMO PREMIUM	PRIMO SAFE.T	PRIMO SD
CLASSIFICATION						
Classification	ISO 10581	Homogeneous vinyl flooring	-	Homogeneous vinyl flooring	-	Static dissipative pressed homogeneous vinyl flooring
	ISO 11638	-	Homogeneous vinyl flooring with foam interlayer	-	-	-
	EN 13845	-	-	-	Slip resistant homogeneous vinyl flooring	-
	EN ISO 10874	34-43	34-42	34-43	34-43	34-43
Wear layer binder content	ISO 10581	Type I	-	Type I	-	Type I
	ISO 11638	-	Type II	-	-	-
TECHNICAL CHARACTERISTICS						
Total thickness	EN ISO 24346	2.0 mm	3.7 mm	2.0 mm	2.0 mm	2.0 mm
Total weight	EN ISO 23997	3000 g/m²	3600 g/m²	3000 g/m²	3000 g/m²	3000 g/m²
Wear layer thickness	EN ISO 24340	-	**2.0 mm**	-	-	-
Foam layer thickness	EN ISO 24340	-	1.5 mm	-	-	-
Adhesive foil thickness	EN ISO 24340	-	0.2 mm	-	-	-
Surface treatment		PUR reinforced	PUR reinforced	PUR reinforced	Safe T clean XP*	-
Form of delivery	EN ISO 24341 Sheet (rolls)	Approx. 23 lm x 200 cm Classic / Spirit: Art. no. 21020___ Spectra: Art. no. 21001___	Approx. 23 lm x 195 cm Art. no. 21085___3 digit colour number	Approx. 23 lm x 200 cm Art. no. 21010___3 digit colour number	Approx. 23 lm x 200 cm Art. no. 21013___3 digit colour number	Approx. 23 lm x 200 cm Art. no. 21012___3 digit colour number
	EN ISO 24342 Tiles (box)	61 x 61 cm - 16 tiles/box = 5.95 m² Classic / Spirit: Art. no. 21021___ Spectra: Art. no. 21003___	-	61 x 61 cm - 14 tiles/box = 5.21 m² Art. no. 21011___3 digit colour number	-	61 x 61 cm - 16 tiles/box = 5.95 m² Art. no. 21016___3 digit colour number
		30 x 30 cm - 50 tiles/box = 4.50 m² Classic / Spirit: Art. no. 21022___ Spectra: Art. no. 21004___	-	-	-	
PERFORMANCES FOR CE MARKING REQUIREMENTS (EN 14041)						
Declaration of Performance	EN 14041	0015-0020-DoP-2013-07	0015-0058-DoP-2013-07	0015-0018-DoP-2013-07	0015-0048-DoP-2013-07	0015-0047-DoP-2013-07
Reaction to fire	EN 13501-1 EN ISO 9239-1 EN ISO 11925-2	Class B_{fl}-s1 ≥ 8 kW/m² Pass	Class B_{fl}-s1 ≥ 8 kW/m² Pass	Class B_{fl}-s1 ≥ 8 kW/m² Pass	Class B_{fl}-s1 ≥ 8 kW/m² Pass	Class B_{fl}-s1 ≥ 8 kW/m² Pass
Electrostatic properties	EN 1815	< 2 kV	-	< 2 kV	< 2 kV	< 2 kV
Thermal resistance	EN 12667/ISO 52612	Approx. 0.01 m² K/W	Approx. 0.01 m² K/W	Approx. 0.01 m² K/W	Approx. 0.01 m² K/W	Approx. 0.01 m² K/W
Slip resistance	EN 13893 DS 7576-2	≥ 0.3 Low risk of slip	≥ 0.3 Low risk of slip	≥ 0.3 Low risk of slip	≥ 0.3 Low risk of slip	≥ 0.3 Low risk of slip
TECHNICAL PERFORMANCES						
Residual indentation	EN ISO 24343-1	Required value: ≤ 0.10 mm Best measured value*: 0.03 mm	Required value: ≤ 0.20 mm -	Required value: ≤ 0.10 mm Best measured value*: 0.05 mm	Required value: ≤ 0.10 mm Best measured value*: 0.05 mm	Required value: ≤ 0.10 mm Best measured value*: 0.03 mm
Impact sound reduction	EN ISO 717/2	-	Approx. + 17 dB	-	-	-
Slip resistance	DIN 51130	R9	R9	R9	R10	R9
Clean room test	ASTM F 51-F51 ISO 14644-1	Class A -	Class A ISO class 4	Class A ISO class 4	- -	- -
Ease of decontamination	ISO 8690	Good	Good	Good	-	Good
Bacteria resistance	EN ISO 846 Part C	Does not favour growth	Does not favour growth	Does not favour growth	Does not favour growth	Does not favour growth
Chemical resistance	ISO 26987	Good resistance	Good resistance	Good resistance	Good resistance	Good resistance
Castor chair	ISO 4918	Suitable	Suitable	Suitable	Suitable	Suitable
Flexibility	ISO 24344	Pass	Pass	Pass	Pass	Pass
Dimensional stability	EN ISO 23999	≤ 0.40 % for rolls ≤ 0.25 % for tiles	≤ 0.40 % -	≤ 0.40 % for rolls ≤ 0.25 % for tiles	≤ 0.40 % -	≤ 0.40 % for rolls ≤ 0.25 % for tiles
Light fastness	EN ISO 105-B02	≥ 6	≥ 6	≥ 6	≥ 6	≥ 6
Electrical insulation	VDE 0100, Part 600	-	-	-	-	$R_t \geq 5 \times 10^4\ \Omega$
Electrical resistance	EN 1081	-	-	-	-	$R_t \leq 10^9\ \Omega$
Bare feet test	DIN 51097	-	-	-	Class B ($\geq 18^2$)	-
Seam strength	EN 684	- Individual values: ≥ 400 N/50 mm	Average value: ≥ 240 N/50 mm Individual values: ≥ 180 N/50 mm	- Individual values: ≥ 400 N/50 mm	- Individual values: ≥ 400 N/50 mm	Average value: ≥ 240 N/50 mm Individual values: ≥ 180 N/50 mm
Underfloor heating		Suitable - max. 27°C	Suitable - max. 27°C	Suitable - max. 27°C	Suitable - max. 27°C	Suitable - max. 27°C
ENVIRONMENTAL PERFORMANCES						
Total VOC emissions	ISO 16000-9 Indoor air quality	≤ 10 µg/m³ (after 28 days) Platinum	≤ 10 µg/m³ (after 28 days) Platinum	≤ 10 µg/m³ (after 28 days) Platinum	≤ 10 µg/m³ (after 28 days) Platinum	≤ 10 µg/m³ (after 28 days) Platinum
COLOURS						
		66	12	36	15	8

The above information is subject to modification for the benefit of further improvement. (04/18) *For information - not binding.

According to the European Regulation N° 305/2011 for CE Marking, the Declarations of Performance are available on our website www.tarkett.com

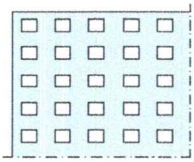
Tarkett's instructions regarding installation, cleaning and maintenance should be observed. Please contact Tarkett at the address shown for these instructions.

Colours of the products shown in the photos or samples are indicative only. There may be differences in colours, gloss and embossing structure between the products sold and photos or samples.

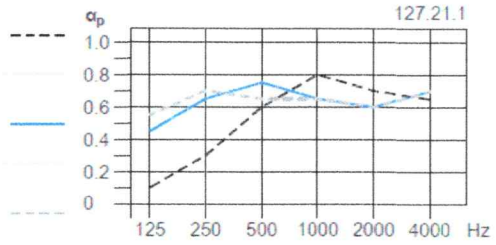
CUSTOMS TARIFF : 4820 5000 00

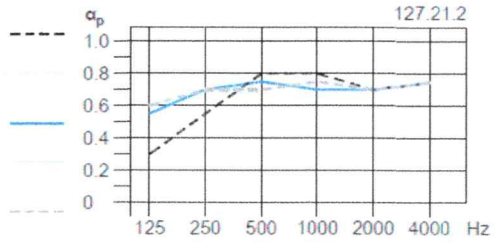
12.5 mm Cleaneo Classic boards with Acoustical Fleece

Perforation pattern	Con-struc-tion depth mm	NRC	α_w	Frequency-dependent absorption coefficient α_p 125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Standard square perforation 8/18 Q	**Without insulation layer**								
	65	0.60	**0.60**	0.10	0.30	0.60	0.80	0.70	0.65
	200	0.65	**0.65**	0.45	0.65	0.75	0.65	0.60	0.70
	400	0.65	**0.65 (L)**	0.55	0.70	0.65	0.65	0.60	0.70
	With insulation layer (For requirements on insulation layer see page 42)								
	65	0.70	**0.75**	0.30	0.55	0.80	0.80	0.70	0.75
	200	0.70	**0.75**	0.55	0.70	0.75	0.70	0.70	0.75
	400	0.70	**0.75**	0.60	0.70	0.70	0.75	0.70	0.75

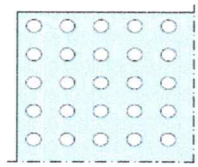


Perforation ratio: 19.8 %

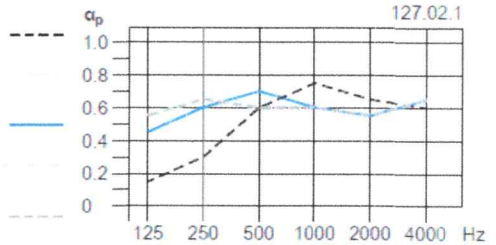


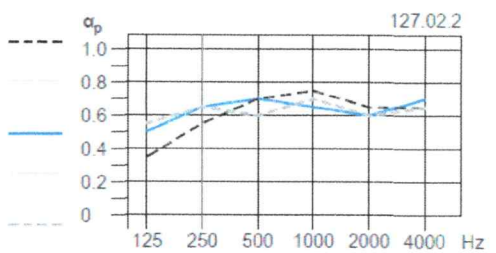


Standard circular perforation 8/18 R	**Without insulation layer**								
	65	0.55	**0.60**	0.15	0.30	0.60	0.75	0.65	0.60
	200	0.60	**0.60**	0.45	0.60	0.70	0.60	0.55	0.65
	400	0.60	**0.60 (L)**	0.55	0.65	0.60	0.60	0.55	0.65
	With insulation layer (For requirements on insulation layer see page 42)								
	65	0.65	**0.70**	0.35	0.55	0.70	0.75	0.65	0.65
	200	0.65	**0.65**	0.50	0.65	0.70	0.65	0.60	0.70
	400	0.65	**0.65**	0.55	0.65	0.60	0.70	0.60	0.65



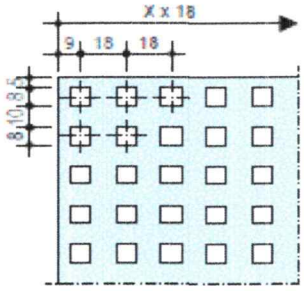
Perforation ratio: 15.5 %



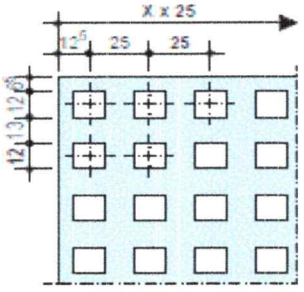


Design	Perforation	Perforation ratio (board)	Board dimensions (Standard sizes) Width	Length	Furring channel Maximum spacings b	Edge designs 4-side square edge (4SK)	UFF	linear
		%	mm	mm	mm			
Standard square perforation	8/18 Q	19.8	1188	1998	333	•	•	–
	12/25 Q	23.0	1200	2000	333.3	•	•	•

Standard square perforation 8/18 Q

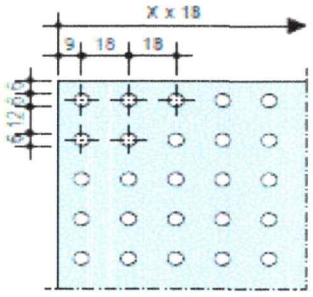


Standard square perforation 12/25 Q

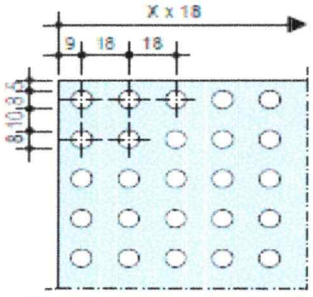


Standard circular perforation	6/18 R	8.7	1188	1998	333	–	•	–
	8/18 R	15.5	1188	1998	333	•	•	•
	10/23 R	14.8	1196	2001	333.5	–	•	•
	12/25 R	18.1	1200	2000	333.3	•	•	•
	15/30 R	19.6	1200	1980	330	–	•	–

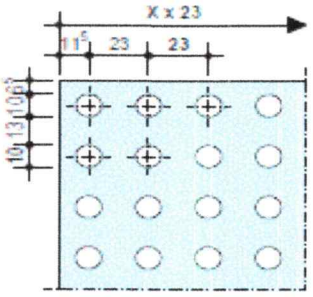
Standard circular perforation 6/18 R



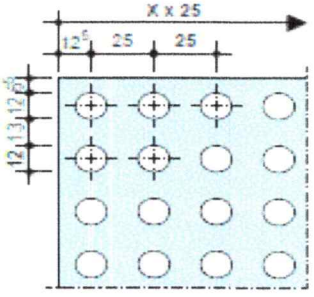
Standard circular perforation 8/18 R



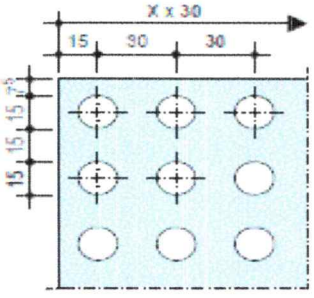
Standard circular perforation 10/23 R



Standard circular perforation 12/25 R



Standard circular perforation 15/30 R



Creative Concrete Concepts

A-Z Prime Bond

Aqueous Dispersion Primer

TECHNICAL DATA SHEET

DESCRIPTION • *A-Z Prime Bond* is a non-plasticized aqueous dispersion based on acrylic and methacrylic acid esters and styrene primer for porous substrates like concrete, plasters, and gypsum.

USES • *A-Z Prime Bond* may be used as a Primer for porous substrates to reduce rapid absorption while increasing adhesion strength and bonding properties of new concrete or repair patches to old concrete and masonry surfaces by simply brushing directly on old surface.

ADVANTAGES •

- ✓ Economical and easy to use..
- ✓ Reduces water permeability.
- ✓ Increases chemical resistance.
- ✓ Can be used on virtually all types porous substrates.
- ✓ Suitable for interior and exterior applications.
- ✓ May be diluted with water for deeper penetration.

TECHNICAL DATA •

Appearance:	Milky, low viscosity liquid
Film Properties:	Almost clear, slightly tacky
Toxicity:	None

COVERAGE • Coverage will depend on surface roughness, porosity, application technique, and job conditions. Approximately 40 sq meter per gallon when undiluted with water.

LIMITATIONS • Do not mix or apply if ambient temperature is expected to drop below 5°C during installation or in the proceeding 24 hours, or if rain is expected in the proceeding 24 hour period after application. Do not allow to freeze. Do not apply over frozen surfaces, rust, water-soluble paints or peeling paint. Do not apply where hydrostatic pressure might be present. When applied as a primer, protect primer coat from dirt and other contaminants until topping is applied.

SURFACE PREPARATION • All surfaces must be free from oil, grease, sealers, dust, paint, form release and curing compounds. Glossy and painted surfaces must be sanded, stripped, and cleaned of all contaminants. Concrete surfaces must be free of efflorescence and accepting of water penetration in order to form a good bond. Test by sprinkling water on the substrate; water beading indicates the presence of contaminants which could cause loss of adhesion. It is recommended to roughen smooth concrete surfaces prior to installation.

APPLICATION • As primer: Dilute *A-Z Prime Bond* with water in a 1:1 ratio and then apply to surface with a roller, brush or sprayer uniformly and continuously. Allow to dry for at least two hours before applying a new topping. Protect the applied *A-Z Prime Bond* from the elements before application of new topping. For deeper penetration and thinner film thicknesses dilute *A-Z Prime Bond* with up to 3 parts of water.

CLEANING • Promptly clean all tools and equipment with clean water.

STORAGE • Store in dry conditions away from direct sunlight and extreme temperatures. When stored at specified conditions in original unopened packaging, shelf life is 12 months from date of purchase.

SAFETY PRECAUTIONS • KEEP OUT OF REACH OF CHIDREN. DO NOT TAKE INTERNALLY. Use neoprene gloves and goggles when handling. FIRST AID: Eyes – Do not rub eyes, immediately flush with fresh water and seek medical attention. Skin – Wash with soap and water. Ingestion – do not induce vomiting; seek immediate medical attention.

PACKAGING • 20 liter pail.

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Creative Concrete Concepts

FoamFix ST

Base & Leveling Compound

DESCRIPTION • *FoamFix ST* is a polymer-modified, fiber-reinforced, cementicious base, leveling, and adhesive compound for vertical applications.

USES • *FoamFix ST* is used as a base coat over a variety of surfaces such as concrete, plaster, block work, precast concrete, gypsum board, cement board, and wood panels in order to prepare the surface to receive a finish coat or paint. *FoamFix ST* also provides a unified surface over these substrates, thereby helping to minimize color inconsistency due to variations in moisture absorption. By embedding *ShieldCrete* fiberglass mesh into a coat of *FoamFix ST*, the system may be used to minimize the transition of fine cracks from the substrate to the finish coat. The high moisture repellency properties of *FoamFix ST* also reduces efflorescence problems on the finish coat.

FoamFix ST may also be used to adhere expanded and extruded polystyrene board to concrete, block, brick, and stucco. It is also used to embed reinforcing mesh into the face of the polystyrene foam board to protect it against impact.

ADVANTAGES •

- ✓ High adhesion.
- ✓ Excellent water repellency properties.
- ✓ Flexible with excellent crack resistance.
- ✓ Ambient Open Time.
- ✓ Single component - just add water.
- ✓ High build - up to 8 mm.

TECHNICAL DATA •

Test	Criteria	Result
Tensile Adhesion (ETAG 004:2000) (N/mm^2)		
• 28 day standard condition	≥ 0.08	0.08
• 28 day SC + 2 day water immersion + 2 h dry condition	≥ 0.03	0.10
• 28 day SC + 2 day water immersion + 7 day dry condition	≥ 0.08	0.09
Water Absorption (DIN 52617) (kg/m^2·h$^{1/2}$)	≤ 0.5	0.25
Impact Test (ETAG 004:2000) (w/125 g mesh)	≥ 3 joules	Pass
Pot Life (minutes)	n/a	45

LIMITATIONS • Do not mix or apply if ambient temperature is expected to drop below 5°C during installation or in the proceeding 24 hours, or if rain is expected in the proceeding 24 hour period after application. Do not mix or apply when ambient temperature is expected to exceed 35°C. Avoid working in direct sunlight. Temporary protection from weather and other damage must be provided at all times until entire job is completed.

COVERAGE • Coverage depends on the tools used for application, surface irregularities and roughness. Coverage is approximately 5.5 sq meters per 25 kg bag, including adhesive and base coats. For adhesive coat only, coverage is approximately 10 sq meters per 25 kg bag; and base coat only, coverage is approximately 12 sq meters per 25 kg bag.

SURFACE PREPARATION • *FoamFix ST* can be applied on an array of bases including exterior grade gypsum sheathing on either steel or wood studs. It is very compatible with clean unpainted concrete, concrete block, brick, and stucco. All bases should be sufficiently rigid, clean of any surface contamination that may prevent good suction. Dense, smooth surfaces, and those retaining excessive amount of form release agent can cause delamination of the board from the base. High gloss, or low absorption surfaces can be made more receptive by sandblasting. Any painted or coated surfaces should be sandblasted or pressure washed to remove existing coating. Surface temperature must not be below 4°C. For best results and maximum adhesion, it is recommended that the base be straight, true to line, and plane; masonry, concrete and brick substrates should be flat within 6.4 mm in any 1.2 m radius. Misalignment of substrate can be corrected with a plaster coating. Under extreme weather conditions, and on highly porous, absorptive surface, the substrate must be sufficiently pre-moistened.

MIXING • Mixing should be completed by mechanical method, preferably with a paddle type mixer. Drill mounted jiffy type mixers at 450-500 rpm can also be used. Always add clean potable water first. One 25 kg bag of *FoamFix ST* will require 6-7 liters of clean potable water. Mixing duration should last for 2 to 4 minutes to insure proper material dispersion within mix. Let set for 10 minutes, re-temper, adding small amounts of water if necessary. Material must be free of lumps before using. The pot life is 45 minutes depending on weather. Small amounts of water can be added during this period to adjust workability.

APPLICATION •

Base Coat Application: For application over concrete, block work, and plaster, slightly mist the surface prior to application of *FoamFix ST*. Use a stainless steel trowel to apply the material to the substrate in a thin layer (1-3 mm) and finish to desired roughness. If *ShieldCrete* fiberglass mesh is to be embedded into the base coat, apply the base coat to the surface of the substrate to an area slightly larger than the width and length of the piece of reinforcing mesh to be applied, in a uniform thickness of 1.5 mm. Immediately place the reinforcing mesh against the wet base coat mixture. The reinforcing fabric must be continuous at all corners and lapped or butted. With the curve of the mesh against the wall, trowel the mesh into the base coat from the center to the edges to avoid wrinkles, until the mesh is fully embedded and not visible. Trowel smooth to a uniform thickness slightly more than the thickness of the reinforcing mesh. Allow base coat mixture to take up until firm to touch. Trowel a second light coat of the base coat mixture over the first coat to fully cover the reinforcing mesh. The result should be such that the reinforcing mesh is approximately centered within the base coat thickness. Do not allow the first pass to completely dry prior to the second pass application or an excessive amount of base coat mixture will be necessary to fully coat the wall surface.

Foam Board Adhesive Application: CAUTION: Do not install *FoamFix ST* directly on the substrate. *FoamFix ST* must be applied only on the foam board. *FoamFix ST* may be applied in dabs to the back of the foam bards or applied with a 13 mm deep, 9.5 mm wide notch trowel to the back of the foam board. Hold the trowel at a 45 angle, applying firm pressure to the foam board in order to scrap the excess adhesive from between the adhesive beads. Apply the adhesive so that the ribbons run vertically when the foam board is placed on the wall. Immediately place the foam board on the substrate, ensuing that no *FoamFix ST* mixture gets into the board joints. Do not allow the *FoamFix ST* mixture to form a skin before positioning the foam board on the substrate, as it will affect the bond strength.

CLEANING • Clean all tools and equipment promptly with clean water.

STORAGE • Keep material covered to prevent exposure to moisture. Store in a dry area. Shelf life is 12 months from date of purchase if stored under recommended conditions in original unopened container.

SAFETY PRECAUTIONS • KEEP OUT OF REACH OF CHIDREN. DO NOT TAKE INTERNALLY. Portland cement based products present health hazards. Irritating to eyes and skin. Use in adequate ventilation and do not breath dust. Use neoprene gloves and a dust mask when handling. FIRST AID: Eyes – Do not rub eyes, immediately flush with fresh water. Skin – Wash with soap and water. Inhalation – If experience difficulty breathing or if inhaled, move to fresh air. If symptoms persist, seek medical attention.

PACKAGING • 25 kg paper bags.

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Creative Concrete Concepts

A-Z HydroSeal

Water Based Acrylic Sealer

TECHNICAL DATA SHEET

DESCRIPTION • *A-Z HydroSeal* is a single-component, ready-to-use, water-based acrylic topical sealer and curing agent that dries to a non-yellowing, sheen finish. *A-Z HydroSeal* protects concrete, plaster, and other masonry surfaces against staining and liquids penetration.

USES • *A-Z Hydro Seal* is used as a clear coat for new and old concrete surfaces subject to light to medium foot traffic, such as stamped concrete, exposed aggregate, granite, and interlock. *A-Z Hydro Seal* is also ideal for protecting timber, masonry and plastered walls against stains and moisture penetration. When diluted it can be used as curing agent.

ADVANTAGES •

- ✓ Enhances the color of stamped concrete and shows the antique and texture effects.
- ✓ Seals and dust-proofs all masonry surfaces.
- ✓ Formulated for interior and exterior use.
- ✓ UV resistant.
- ✓ Protects against stains and liquids.
- ✓ Low VOC and non-toxic.

PHYSICAL PROPERTIES •.

Volume Solids	25%
VOC (USEPA 24)	6 g/l
Chemical Resistance Nitric Acid (2%) Sulfuric Acid (10%) Ethanol (50%) Vinegar Alkali Sol. (pH 11.5)	 Excellent Excellent Good Excellent Good
Stain Resistance	Catsup, soft drinks, wine, house dressing, and commercial cleaners.
Moisture Vapor Transmission (ASTM E-96)	15 perms
Dry Time (21C, 50% RH)	30 min. to touch, 1 hr. recoat, 4 hrs. foot traffic, 24 hrs. heavy traffic, 48 hrs. full cure.
Dry Film Thickness	25-50 microns

LIMITATIONS • Do not apply if ambient temperature is expected to drop below 7°C in the proceeding 24 hours. Do not apply if rain, dew, or water exposure is expected within 24 hours after application. Avoid application in direct sunlight and during high winds. Do not apply on areas where negative hydrostatic pressure is possible. Apply in thin coats only; never apply in thick coats. Not recommended for dense surfaces such as marble, glazed tile or granite. Check compatibility with coating on previously treated surfaces. *A-Z Hydro Seal* enhances the color of treaded surfaces and will therefore slightly alter the natural appearance of treated surfaces. Not intended as a waterproofing membrane.

COVERAGE • Coverage rates depend on porosity and texture of the surface, method of application, and other surface and job conditions. Minimum two coats are recommended for flooring applications. Typical coverage rates on most masonry surfaces is 80-100 sqm/20 liter pail on smooth surfaces.

SURFACE PREPARATION • All surfaces must be clean, free of grease, oil, dirt, wax, and other foreign matter that may inhibit penetration of the sealer. In some cases, stripping of old coating by chemical or mechanical means may be necessary to insure good bonding of the new sealer coat. Allow surface to dry for at least 24 hours. Do not use soap or detergent for cleaning; residue may prevent the sealer from bonding to the surface.

APPLICATION • Avoid application in direct sunlight, or during strong wind. On hot days, apply early in the day when temperatures are lower, and when the surface is in the shade. Mask or protect surrounding areas from spills and contact with product or equipment. Rope off working area, close to traffic, and remove surrounding vehicles.

After thorough preparation of the surface, *A-Z Hydro Seal* can be applied by brush, roller or spray. A short hair nap roller is recommended for smooth surface. For textured surfaces, a 9-12 mm nap roller should be used. A hand-pump commercial grade sprayer is also an excellent tool for application. Two undiluted applications of *A-Z Hydro Seal* are highly recommended for full stain protection on floors; allow 12-24 hours drying time between coats. For walls and vertical applications, a single full or a diluted coat may be sufficient depending on the degree of protection required. Dilution will also reduce the degree of gloss.

Do not allow foot traffic for 24 hours after final application. Area may be opened to regular foot traffic after 72 hours.

A-Z Hydro Seal may also be used as a curing agent by diluting it 1:1 with potable water and applying it by spray on the same day of casting as soon as the concrete has set.

MAINTENANCE • Treated surfaces should be inspected periodically for thin or traffic-worn areas; dull color and/or water absorption are good indicators of thinned out sealer coats. Stain damaged or discolored sealer coats must first be removed by chemical or mechanical means.

CLEANING • Tools and equipment must be cleaned with soap and water.

STORAGE & SHELF LIFE • Product should be stored in dry conditions away from direct sun light or freezing conditions. Shelf life is approximately 12 months from date of purchase in original unopened container under specified storage conditions

SAFETY PRECAUTIONS • KEEP OUT OF REACH OF CHIDREN. DO NOT TAKE INTERNALLY – harmful or fatal if swallowed. Do not breath vapor or mist. Use in a well-ventilated area. Use a properly fitted organic vapor respirator (NIOSH TC-84A approved). Use goggles, protective clothing and vinyl gloves when handling. Keep away from sources of heat or ignition. FIRST AID: Eyes – Do not rub eyes, immediately flush with plenty of fresh water while holding eyelids apart. Skin – Wash with soap and water. Inhalation – Leave the area if experience difficulty breathing. Ingestion – Immediately give large amounts of water and induce vomiting; seek immediate medical attention.

PACKAGING • 20-liter pail.

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Creative Concrete Concepts

ProofCrete 710

1K Cementitious Waterproofing Coating

TECHNICAL DATA SHEET

DESCRIPTION • *ProofCrete 710* is a superior cement-based dampproofing/waterproofing system for concrete and masonry surface.

ProofCrete 710 is a permanently flexible "breathing" membrane, allowing moisture vapor from the substrate or building interior to escape through the membrane while remaining impervious to water penetration from the exterior.

ProofCrete 710 is a single component factory blended mix of cement, fillers, acrylic admixtures, plasticizers and other chemicals.

USES • *ProofCrete 710* was specifically developed to waterproof concrete and masonry building exteriors. It is recommended for exterior facades, walls, floors, and flat and corrugated roofs.

ADVANTAGES •

- ✓ Ready to use, just add water.
- ✓ Excellent waterproofing and damp-proofing of substrate.
- ✓ Easy to mix and apply by brush.
- ✓ Non-toxic for potable water reservoirs or foodstuffs.
- ✓ Prevents cracks from telegraphing.
- ✓ Does not promote fungus growth.
- ✓ Tough with high impact resistance.
- ✓ Forms a membrane that is water and chemical resistant.
- ✓ Creates a flexible membrane that bridges any structural movement or drying shrinkage cracks.
- ✓ Low VOC.

LIMITATIONS • Never apply to new concrete surfaces before they have been allowed to cure for a minimum of 28 days. Intended only as a coating - do not use to fill cracks or holes in the surface.

Do not apply when the ambient temperature is below 7°C. Do not apply when the relative humidity is in excess of 95%. Do not apply if weather conditions will not permit complete cure before rain or freezing temperatures occur.

PHYSICAL PROPERTIES •

Compressive Strength (ASTM C109-80)	30 MPa – 7 days
Tensile strength (ASTM C190-77)	1.7 MPa – 7 days
Flexural Strength (ASTM C348-80)	2.5 MPa – 7 days
Water Absorption (ASTM C67)	3.6%, 24 hours
Sand Abrasion (ASTM D968)	3,000 L. Passed
Water Vapor Transmission (ASTM E96)	7.8 perms.
Permeability [on Concrete] (Positive Hydrostatic)	No Signs of Discoloration
VOC Content	0 g/L

COVERAGE • The theoretical thickness for coverage is based on smooth, non-porous surfaces. *ProofCrete 710* is applied at the rate of 1.5 kg per sq meters at a 1 mm thickness (or 16.5 sq meters per 25 kg bag at 1 mm thickness).

SURFACE PREPARATION • **New and unpainted** surfaces must be structurally sound, clean, dry, fully cured, and free from dust, curing agents, form release agents, efflorescence, scale, and other foreign materials.

All cracks larger than hairline shall be considered as moving and must be repaired with *PatchCrete 102 Crack Filler*. All delaminated and splashed areas of concrete shall be repaired prior to application of *ProofCrete 710* with *PatchCrete 101 Multi-Use Repair Mortar*. Remove all unsound concrete. Patches shall be flush with the surrounding surface and shall match the texture of existing surfaces.

Previously painted surfaces shall be sandblasted or water blasted to remove all paint and bring it to bare a sound surface.

MIXING • *ProofCrete 710* is supplied in paper bags with the binder included in powder form ready to use after mixing with water. In a clean container add 25 kg of *ProofCrete 710* to approximately 1.5 gallons of potable water while mixing. Use a ¾" drill with a mixing paddle at low speed (approximately 300 RPM). Mix components for 3-5 minutes, allow to slake for 3-5 minutes, then remix prior to applying. Do not over mix as this could entrap air. Pot life is approximately 30-90 minutes.

APPLICATION • *ProofCrete 710* may be applied by brush or hopper spray gun. It is essential that the first coat be thoroughly worked into the substrate to completely fill and cover all voids, holes, and nonmoving cracks.

Always apply in two coats in order to avoid pinholes. Subsequent coats must be applied in a direction perpendicular to the previous one in order to insure thorough coverage of the surface. Allow 24 hours drying time between coats. The second coat shall be applied in a direction perpendicular to the first coat after it has dried.

Surfaces subject to continuous splashes or permanent contact with water storage tanks shall be left to dry for at least 4 days before they are filled with water.

CLEANING • Tools and equipment may be cleaned with fresh water.

STORAGE & SHELF LIFE • Product should be stored at 25°C in dry conditions away from direct sun light. Shelf life is approximately 12 months from date of purchase in original unopened container at specified storage temperature.

SAFETY PRECAUTIONS • KEEP OUT OF REACH OF CHIDREN. DO NOT TAKE INTERNALLY. Use goggles, protective clothing and vinyl gloves when handling. FIRST AID: Eyes – Do not rub eyes, immediately flush with fresh water. Skin – Wash with soap and water. Ingestion – Seek immediate medical attention.

PACKAGING • 25 kg paper bag.

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